PC

The Independent Guide to IBM Personal Computers

T.M.

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PCOLOR SPECIAL: Color Display Survey, Using PC Graphics

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Boca Diary

Visiting the Birthplace of the IBM PC

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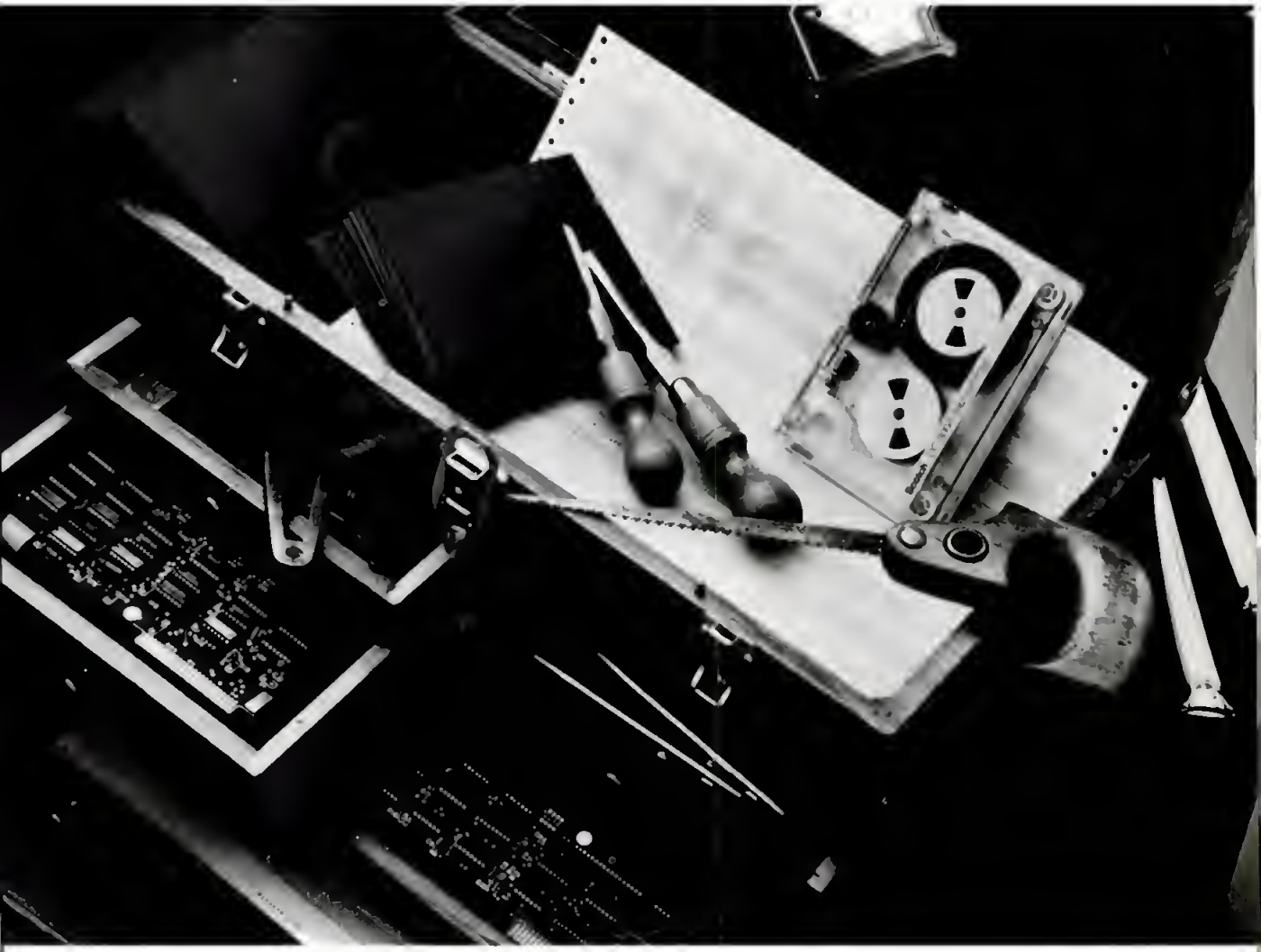

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MICROSOFT

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April-May 1982

The Independent Guide to IBM Personal Computers

IN THIS ISSUE

Cover Story

Boco Diory/David Bunnell 21
A raport on PC's pilgrimage to the PC's birthplaca . . . including an exclusive interview with Don Estridga, head of IBM's Personal Computer project.

IBM Eye

Cronking Up The Softwore Mochine/Jim Strothman 38
On-site report: IBM's software publishing oparation.

Competition

High Noon/Corl Worren 44
Tandy calls out IBM, packing a new 16-bit, $4,495 weapon.

PC-Lab

Testing T.I.M./Lorry Press 48
Putting tha PC's first availabla file manager through its paces.

User's Report

T.I.M. Foces Reol Life/Cheryl Woodord 54
How the *T.I.M.* program worked out in *PC*'s real-world situation.

Communications

The Virtual Conference/Clifford Borney 58
Using your Personal Computer for on-line conferencing.

Hardware

Color Displays/Jim Edlin ond Lindo Thotcher 66
Color for the PC: What's available and how to choose.

Color Printers 71
The final step—getting pretty colors onto paper.

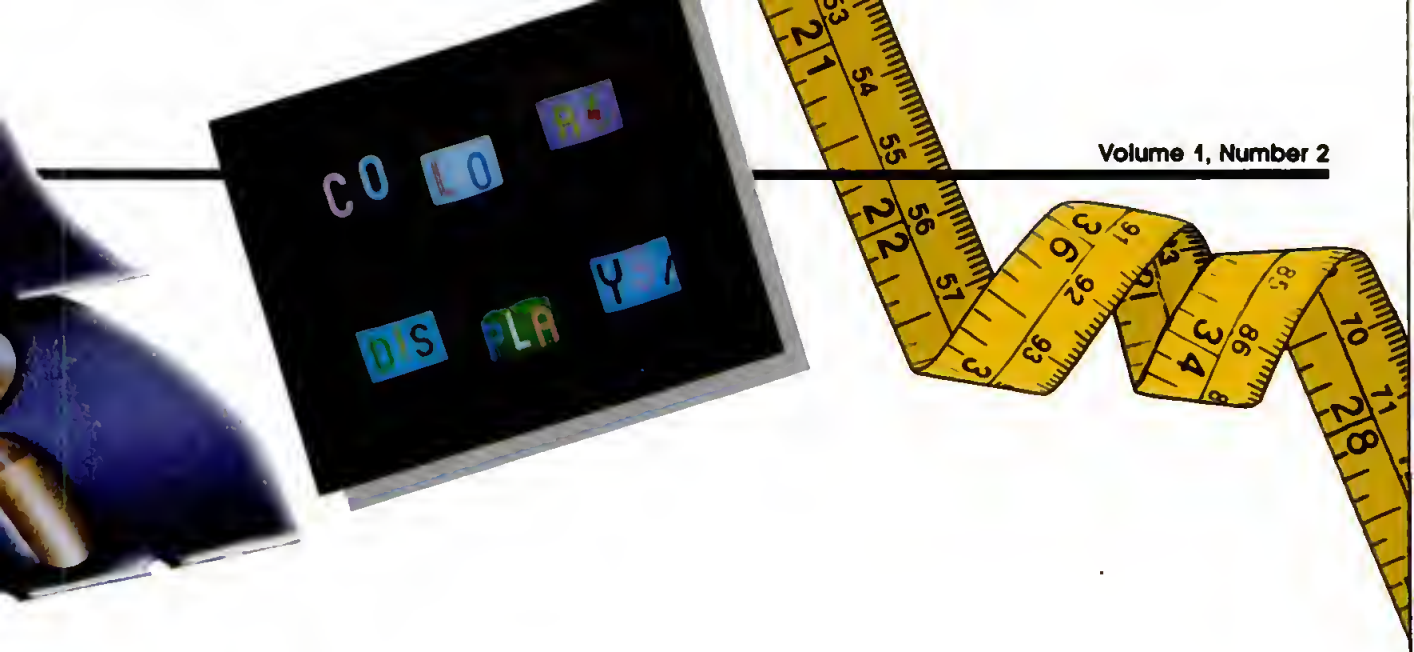
Programming

Using Color Grophics/Lon Poole 75
A hands-on, how-to introduction to PC BASIC's powerful graphics commands.

Mogic PCube/Korl Koessel 85
A simulation of Rubik's Cube on the IBM PC.

PC Profile

A Tale Of Two Beginnings/Jeremy Joon Hewes 89
How a corporate exacutive and a personal technology consultant are using IBM Personal Computers.



Volume 1, Number 2

PC Playpen

Math Gomes/Prof. D. H. Cobboge 100
Can the PC make learning arithmetic fun?

Issues

Perspectives on Protection/*Hol Glotzer*..... 106
The whys and hows of "copy-protecting" software.

Follow-Up

EosyWriter Updote Coming/Jim Edlin 114
Information Unlimited says revised version being readied.

Taking The Measure . . . (Part 2)

User's Monuols/Jeremy Joon Hewes 116
Do the reference books measure up to the machine?

Basic Benchmorks/Lorry Press..... 118
Putting a stopwatch on the PC's BASIC language.

Age of Altair

Context Of The Revolution/*David Bunnell ond Eddie Currie* 138
Part II of this series tells why computer kits weren't for everyone.

Columns

Dovid Bunnell..... 11
Cowboy Publishing

Zero Base Thinking/Jim Edlin..... 12
The Monochrome Mistake

Communicotions Briefs/*Clifford Borney* 63

Departments

Letters to PC..... 6

PCommuniques..... 15

User-To-User..... 104
EosyWriter tips and more . . .

PC Book Review..... 112
IBM's Personal Computer, Que Corp.

New On The Market..... 125

PC Interview..... 131
Microsoft's Vern Raburn

Directories..... 135

Advertiser Index..... 143

Wish List 144

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Letters to PC

English vs. "Computerese".

Last weekend I acquired the first issue of PC at the San Diego Computer Show and was thrilled to finally find a magazine providing information about micros written in "ENGLISH."

Rookies, like myself, find it very difficult to make sense out of the articles in most magazines on the market today. They are mostly written for professional programmers, analysts, etc., who, with years of experience, have acquired the command of the "Computerese Language." Born and raised in Italy, I have had a hard enough time learning English, not to mention all the abbreviations used in American-English.

I found Andrew Fluegelman's article on *EosyWriter* particularly interesting, I will gladly refrain from using it!

Mimma Fonti
The ANSWER in COMPUTERS
San Diego, California 92115

Oral exam for PC prize?

I'm puzzled about the color/graphics monitor adapter included with the 16K computer you advertised to give away. I was informed by one of the local IBM retail stores that the color/graphics monitor adapter requires 32K to operate It. If that is true, the system described In your advertising will not work. I am not sure I want to win a system that requires me to buy some additional item to make the system work.

Have I been misinformed? If the retail dealers are correct, that leaves me concerned about the accuracy of the information you will print. You are, after all, supposed to become the printed authority on the IBM Personal Computer.

Bruce Baker, Jr.

Looking o gift computer in the mouth, eh? Well, either you hove been misinformed or you misunderstood. The PC system prize in our sweepstokes thot ended Februory 28 is fully functionol. It is, in foct, the basic system thot IBM features in its odvertisements. The color/grophics odopter hos 16K of display memory built in; odded to the 16K in the computer, perhops thot is the "32K" you were told obout. We wouldn't knowingly give out o bum computer—or bum informotion. But your question points out thot the mony PC options con be confusing. See this issue's ortiele on color displays for more enlightenment.

Displaywriter fan's plea.

I do not own a Personal Computer, but I do own the IBM Displaywriter (8086 microprocessor) which resembles in some ways the PC (8088). I've bought CP/M-86 and CBASIC-86 specially configured for the Displaywriter by Digital Research. Also, IBM is said to be preparing a BASIC and some equivalent of the *VisiColc* program for the Displaywriter. It might be e good idea to create a sectlon In your magazine—just a page maybe—for Displaywriter owners. We are bound to be very much interested in what's available for the Personal Computer, because a good part of the software might run or be transferable to the Displaywriter—which happens to be one of the most sophisticated 16-bit microcomputers on the market. I for one am subscribing to your magazine for precisely that reason.

Georges Khal
Atelier Cybernetique Orphee
Montreal, Quebec

We plon to odd some Displaywriter coverage in future issues.

Why IBMers buy.

Two things to comment on: first, why do you think IBMers buy computers for other reasons than "regular folks" do? The many IBM friends I know who are buying an IBM Personal Computer are doing so because they are upgrading from a TRS-80 or Apple Computer, not because of any expected shortage or chance to make a buck.

Second, comments regarding the article on *EosyWriter* by A. Fluegelman: regarding the "block move" tips, the 'block copy on', 'block copy off' messages are not ambiguous. In the 'block copy on' mode, it is possible to use CNTL "G" more than once to place a given block at different spots in your text. In the 'block copy off' mode, only one copy of the block is permitted. You can hit CNTL "]" one or two times, depending on which mode is desired. Also, only one "ENTER" is needed after Inserting the second block marker, and only one delete is therefore needed when clearing it later.

Although *EasyWriter* may not be on a par with some more costly programs such as WordStor, I find it to be highly useable.

I thoroughly enjoyed Volume 1, Number 1; I hope you soon decide to meke it monthly.

Kenton Graham
Round Rock, TX

The writer who speculoted on why IBM employees ore buying PCs so eogerly responds thot he knows plenty of "regulor folks" who are very receptive to chonces for moking o buck. Re: monthly publicotion of **PC**, *it will commence this August.*

More about *EasyWriter*.

The "Not-so-*EasyWriter*" piece by Andrew Fluegelman is interesting and useful. I have just assisted one of my clients in installing this text editor and the results were excellent. My client was not looking for a super system, but something easy that he and his secretary can use to produce relatively simple material. The biggest problem was that the manual provided by IBM is far too complicated for the neophyte. I had to produce an entirely new manual suitable for people who are essentially computer illiterates.

Prof. Andrew Vazsonyi
St. Mary's University
San Antonio, Texas

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I am very pleased with my IBM Personal Computer. I also purchased the *EasyWriter* software. Previously I had a TRS-80 Model 1 computer for three years. With that, I used two word processing programs, Scripsit and *The Electric Pencil*. I was pretty fast on them, and once I knew the system I didn't make any disastrous mistakes. It was a different story with "not-so-*EasyWriter*." I wanted to try out the features of my new Epson MX-100 printer, but found to my dismay that all was not OK with either the documentation or the software. For instance, I spent two days trying to learn how to underline words . . .

Frank P. Vlamings
Newark, California

Mr. Vlamings' tips on how to make EasyWriter *do underlining on the* Epson *printer oppears in this issue's User-To-User section.*

Regarding the article on the *Easy-Writer* program, I agree! So do others I have talked to who have used the version on the IBM PC. I regard the pen I am holding as a true easy writer compared to the program product. I wish I could get my money back. I would much prefer a full screen editor and text formatter which uses *standard* system files.

Robert Fritz
San Diego, California

I hope Mr. Fluegelman's comments have been passed on to IBM and Information Unlimited Software, Incorporated. User feedback of this nature is vital to the health of personal computing. A future release of this product that corrects and enhances its weak spots, I am confident, will be well received by the user community.

Another sore spot in the software arena of the IBM PC is the PASCAL compiler. The compiler requires a minimum of three diskette changes during each and every compile. Putting disks in and out of the drives is an operational nightmare. The problem stems from the limited disk storage capacity (160K per disk). This may be a subtle strategy to get PASCAL users to migrate to hard disk. An improvement in the operation of the PASCAL compiler is definitely needed.

C.L. Pfau
Ralston, Nebraska

Random (and sequential) request.

I've had a PC since November (color, disk, 128K, printer) and am interested in learning how to set up random and sequential files and, via a modem, move them back and forth to a mainframe. Any articles on this in the coming year would be appreciated, since the appendix which covers this in the BASIC manual is neither clear nor exemplified well.

Leslie Hendrickson
Eugene, Oregon

Watch for o two-part series on using BASIC for random and sequential files—and even explaining what the heck they are—in PC's *next issue.*

Miscellany . . .

I need help in finding a "letter-quality" printer which can be interfaced with the IBM PC, which has a print wheel to match the typeface of this letter, i.e., "Letter Gothic," 12 pitch. I have seen some print wheels advertised for Qume printers, which meet this typeface in appearance. Do you know of any others?

Samuel E. Jeffries
Raleigh, North Carolina

A report on ovoilable letter-quality printers is in the works for loter this yeor.

I take exception to the reference that the first personal computer publication was Altair related. *Recreational Computing* née *People's Computers*, née *People's Computer Company* was continuously published since its 1972 debut, until its sale last year. But since we started it well before the machines actually existed in micro-form, perhaps it is more precisely labeled the first personal computing periodical—for real hair splitters. Keep up the great work, and bon voyage!

Marlin Ouverson
Editor, *Dr. Dobb's Journal*
Menlo Park, California

As an IBM employee, I am pleased to see that your publication lives up to the same standards as some of ours. Keep up the good work.

Terry Taylor
Hayward, CA

Number Crunching, etc.

We expect to purchase an IBM PC, but our main application is in engineering and will involve a great deal of number crunching. We've heard about the impending Intel 8087 floating-point processor which should help speed up this type of computing, but we have several questions which no one seems able or willing to answer. First, is the 8087 intended to supplement the 8088 or will it replace the 8088? Also, if we purchase the IBM PC now, will we be able to add the 8087 later when it is available? If it is added later, will we need all new software? We also wonder whether

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LETTERS TO PC

double-precision computations with either the 8088 or the 8087 will provide the 32-bit accuracy obtained with the IBM 360 and 370 systems, or if we should consider a different microcomputer for number-crunching applications?

Alfred T. Miesch
George Van Trump, Jr
Lakewood, Colo

Your questions indicate a healthy attitude—namely starting with your needs rather than a choice of hardware. We don't have specific answers, but may have more when the 8087 option is actually offered.

Whither PC

I found your predictions of resounding success for your magazine interesting, but I have a somewhat different prediction for you. You will do quite well at first. Then the very machine to which your pages are devoted will be your undoing. I predict that the IBM Personal Computer and the networks that connect them together will put most printed paper magazines out of business within a surprisingly short time. The technology now exists to produce electronic magazines, including advertising with color pictures of the hardware, and actual demos of how software operates, and get them to a large number of users very quickly. Soon, someone will do it. I predict the first subject will be one of interest to everyone capable of receiving the magazine-Personal Computers. I would love to have had a copy of your first issue in early December. I would have considered it very good, then. Now it's old hat, compared to the information that's been coming over IBM's internal network. I suggest you either find a way to get your magazine to readers a lot more quickly, or be the first to produce a good electronic magazine. If you don't, I predict you'll be out of business within five years.

Bob Blase
New Paltz, NY

Perhaps you didn't notice, but the name of the company that publishes **PC** *is "Software Communications, Inc." Chew on that awhile, fellow.*

—DHE

PC welcomes letters from readers. Write to: Letters, PC, 1528 Irving St., San Francisco, California 94122. Letters published may be edited.

DAVID BUNNELL

Cowboy Publishing

First off, let me warn you that you may have a hard time understanding Cowboy Publishing and how it relates to *PC* magazine.

You may decide that the whole idea is just plum loco, and p'rhaps it is.

However, I 'spect it will make a mite more sense to most of y'all once I've given you the story behind it all.

So, like or not, here goes.

This here magazine got started in the spare bedroom of our home last October 1. By Halloween, it had grown into the dining room. Then by November it was in the kitchen, the dining room, the basement and was starting to sneak into my bedroom.

By December our living room was an art production department where artists Don and Linda Nace, who came from New York, worked from sunup 'til the cows came home, helping to put the first issue together.

"As soon as that little dogie is down and hog-tied, you go out and find you some office space."

And the amazing thing is, that although there were a few tough moments, we not only survived, we got a bit tougher and a whole lot smarter in the process. You'd think we were working at Time, Inc., and not out of a house in San Francisco, judging from the results.

Well, let me tell you, some mornings me and my family didn't know what to do. Them phones would start ringing off the hook about 4:30 a.m. with people who wanted subscriptions and information on advertising and all sorts of stuff like that.

Jacqueline, my wife, planned to work for the magazine part time as staff photographer. Well, she ran herd on the entire subscription department, supervised the proofreading, provided traffic management between editorial, art and suppliers including the typesetter and printer, and still did the pictures and even a little word processing as well as a zillion other things.

My side-kick and good ole buddy Jim Edlin, who's been around personal computing a long time, just like me, decided he'd like to pitch in. Jim wound up sharing the spare bedroom/office with me where he acted in tandem as associate publisher and editor and somehow found time to write copy.

PC's other associate publisher, Cheryl Woodard, who used to round up buyers for Osborne/McGraw-Hill books, was situated in the dining room where she single-handedly organized and operated the sales and marketing effort of *PC*.

Between startup in October and the printing of the Charter Issue in January, some 34 folks worked at one time or another in our large, but not *thot* large, house.

We didn't just work at putting out *PC* magazine, we *lived PC* magaine.

Now early one morning last December—which seems like about six years ago—I came down the stairs in my bathrobe to fetch a cup of coffee and perhaps even fix me up some toast before the phone started up. I looked at the dining room table piled up with stacks of paper, typewriters, and other office gear. I looked at the kitchen table, which was also piled high with stacks of paper, typewriters, etc. There were boxes and boxes of brochures near the door. There was a makeshift table in the parlour with an IBM Personal Computer on it, and beside that was a dual 8-inch disk drive (which never was connected to anything, anyway).

"What is this?" I hollered.

Some few hours later when folks were running up and down the stairs to answer one of the three phones in the office because the two phones in the dining room were being used, the answer came to me. I stopped dead in my tracks and mumbled to no one in particular, "This is Cowboy Publishing."

Well, now, do you understand? Cowboy Publishing was how we managed to get *PC* out so fast and right pretty, too. You see, we didn't have no time to set up offices, roundup furniture, and do all them things. We was publishing a magazine.

But, as fun as Cowboy Publishing is, the real trick is to only do it once. As soon as that little dogie is down and hog-tied, you go out and find you some office space. You hang up your spurs and start being a real business.

Actually, Cowboy Publishing refers to days gone by. Nowadays, we're just weekend cowboys. Still, we like to sit around the fireplace and spin a yarn or two, and we 'spect before long we'll have some new tales to tell.

The Monochrome Mistake

One afternoon in January, Carl Warren phoned to chat about Radio Shack's new Model 16 computer, which he had seen introduced.

Among the product features Carl described with approval was the Model 16's "high-resolution" (capable of showing fine detail) display graphics. I immediately interrupted to ask, "Does it also have color?" Carl's equally immediate reply, dripping with "what-a-dumb-question," was, "It's a business machine!"

There was no mistaking that Carl's implicit answer was, "No, of course not!". Or that his censure, almost certainly mirroring Radio Shack's attitudes, was based upon the assumption that business computers were designed for serious use and therefore (obviously) need have no truck with fancy fripperies such as color display.

The attitude is commonplace. When computer manufacturer Adam Osborne spoke about his then-new Osborne I at a convention, someone in the audience asked him why he hadn't provided for color in his machine. His answer: "If you want to play games, get an Atari."

Such views, so confidently expressed, cause me to imagine movie bigwigs a few decades ago blustering among themselves, "Well that color stuff is alright for the cartoons, but it just wouldn't be appropriate for serious dromo." That was before they saw *Gone With The Wind*, no doubt. Their spiritual heirs are the computer experts who disdain color in workhorse products.

Why are dismissals of color by other manufacturers relevant to the IBM PC, which does have color capability? They are relevant because, according to reliable sources, few buyers are choosing the PC's color options. The word is that, so far, the bulk of PCs are being equipped for monochrome only.

If true, that is readily understandable. But I think it is also a pure shame.

Several facts encourage the choice of a monochrome display. Though IBM offers a color adapter card, it sells no color equivalent of the monochrome display. IBM's monochrome display is handsomely integrated with the rest of the PC's cabinetry, and it provides appealingly

At the end of your rainbow is there a pot of black and white?

crisp, readable characters on the screen. The choice of monochrome shaves hundreds of dollars, if not a thousand or more, off the price of a complete system. And very little PC software—none of it among the workhorse programs—takes full advantage of the system's color capabilities.

The facts favoring a choice of color are less tangible; although they should prove more compelling. At the top of the list: Software which exploits color cleverly will help your computer serve you as a more powerful and efficient tool. Unfortunately, this is hard to appreciate without experiencing how it does so, just as you may once have found it hard to appreciate how a computer, or word processing, or a spreadsheet program, or whatever you now depend on, could contribute to your business efforts.

In a spreadsheet program, color can help you quickly distinguish positive amounts from negative, totals from line items, and so forth. In word processing, color can help marked sections stand out from the rest of your text, can visually separate text from status information, and can do all sorts of similar, useful things.

Whenever information is presented in graph form, color is a major aid to comprehension. In general, programs can be made faster and easier to use if color cues are used to guide you through their options—much as colored lines on the floors or walls of buildings provide visitors with at-a-glance directions.

If you will be paying other people to do much work at the computer, color offers another intangible benefit. Color is friendlier to work with, more stimulating. One's brain is less inclined to go numb when staring at a screen that offers changing color stimulation to the eyes, which ought to translate to a very tangible benefit—the increased productivity of people working at the computer.

If you are buying a PC setup equipped for business, you will probably be spending between four and five thousand dollars on a monochrome version. An upgrade to color would increase your investment by perhaps 20 percent. But, when good color software becomes available, I expect it will quickly help you pay back the extra investment.

There, however, is the rub.

Software developers are flocking to get in on the opportunity created by the IBM Personal Computer. But, if few buyers purchase color systems, few software developers will work at exploiting the PC's color features. IBM's Don Estridge, who directed the development of the PC, says graphics and color features were considered important to provide for because "We thought the capability you see now in games would ultimately be available in business applications." IBM, however, has left it to you to decide whether you want to include those features in your initial system.

I think that if you settle for monochrome, you are making a big mistake. If you want to see those super-programs that Don Estridge envisioned, you ought to make the investment that will encourage their development. Business or pleasure, once you enjoy the power of good color software, you'll never want to go back.

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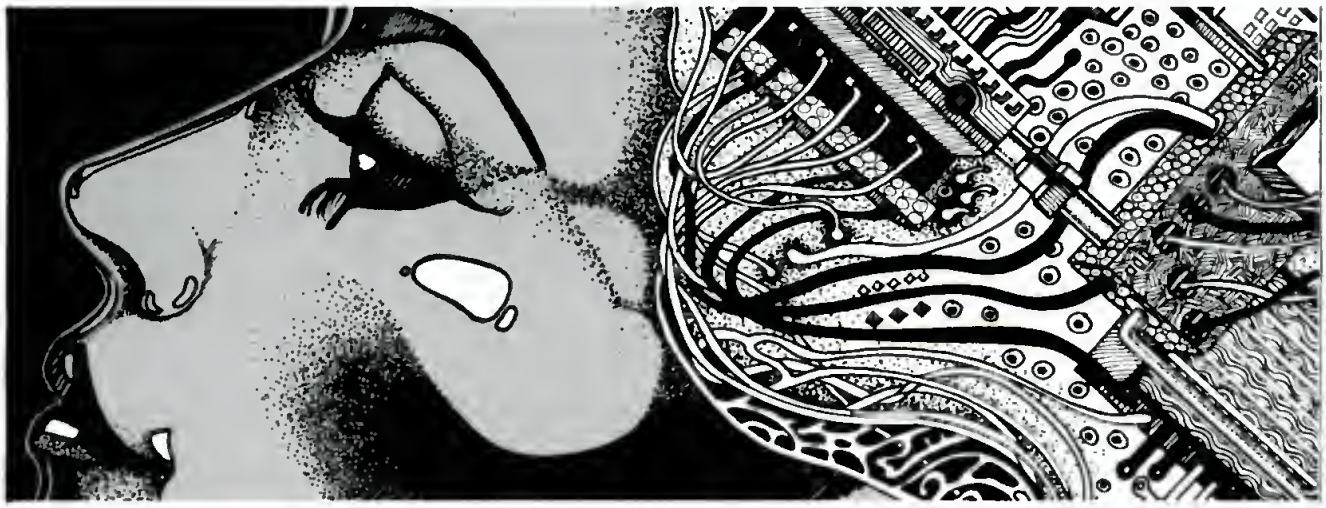

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PCOMMUNIQUES

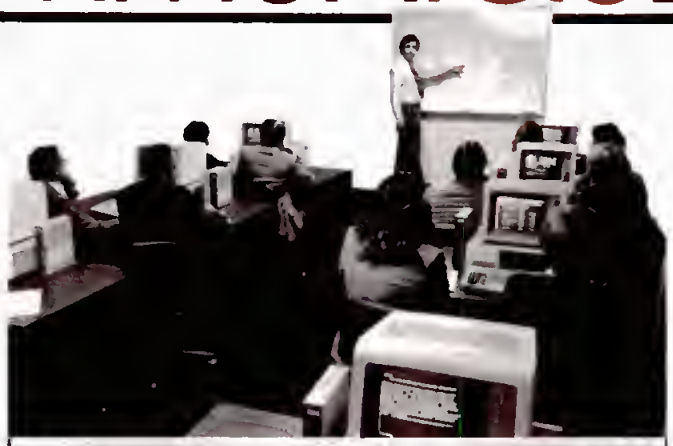
A compendium of facts, news, opinions, gossip, inside intelligence, speculation and forecasts about IBM Personal Computers.

Higher Math

It has been widely reported that the empty componant socket in the IBM PC's main circuit board has been provided for eventual installation of the Intel 8087 mathematics "co-processor." Now comes a hint that one other empty socket on the circuit board is also awaiting the 8087's appearance.

The sockat in question is the empty one next to the bank of read-only memory chips where PC BASIC and the core of the operating system are stored. An informant tells us that the empty socket is being saved for an enhancement to BASIC that will use the 8087's high speed math. Tha "floating point" math routines in the new BASIC chip will, it is said, supplant those now used and will increase number-crunching speed dramatically. Our informant claims to have tested an 8087-equipped machina with the enhanced software and says "it runs like a 360," (a large IBM computer of years past). When spreadsheat and other number-intansive programs are rawritten to take advantage of the chip, our 8087 fan says they will run unbelievably faster. As for graphics, the fans says when the CIRCLE statement is used in 8087-enhancad BASIC, "a circla doesn't draw itself around the screen, it's just there."

If tha 8087 is so wonderful, how come you can't get it for your PC yet? Wa're told Intel is not building the chip in production quantities so far. The present versions of the chip apparently find all that arithmetic something of a chore and heat up 'til they are too torrid to touch. Debugged versions will have to run cooler befora production quantities will be seen. Meantime, IBM is said to have several PC's running with preliminary releases of the 8087. With the covers off, we presume.



Franchise Adopts PCs

Newest franchised business to hit the microcomputer scena is a hands-on school teaching how to put the little beasts to work—a sort of electronic-age Evelyn Wood course. And the computers they bought for students to lay hands on are—you guessed it—IBM PCs.

Tha Evelyn of this play is Phoenix entrepreneur Tom Palazzo, and his emporiums are christened CompuGuidanca International Computer Training Centers. While Palazzo says the instruction is adaptable to "virtually every popular microcomputer availabla," it is the PC that his students are going to be getting intimately familiar with. Ten core courses are said to be available from your local CGI, with the dual objectives of helping you determine the best system to buy, then maximizing its effectivaness after purchase. (How coincidental! That's what wa think PC is all about too.)

Buggy BASIC

Speaking of the PC's BASIC language, a few bugs have turned up in the initial version—as several informants have taken trouble to advise us. One whisperer also tells us that the BASIC now delivered with PC's is recompiled code done for the 8080 microchip (the data in this issue's "BASIC Benchmarks" article tends to support that) but that a new, faster varsion using tha full

8086/8088 instruction set is on the way. Rumor has it that replacement BASIC memory chips are coming, that they will both fix the bugs and have the faster program code, and that PC owners with the old chips will likely be offered a painless way to switch. (Please don't bug IBM on the strength of this buggy rumor; if it turns out to be true, we'll print a confimation.)

One bug we found ourselves is that when you list a BASIC program to the COM port (where our serial printer is connected) lines are ended with a carriage return but no line feed. Thus, the program ends up printed all on one indacipherable, very black line! There is a suggested fix for this in our User-to-User pages.

Colorless Clue

Have you wondered how come IBM sells a beautiful monochrome display for tha IBM Personal Computer, but offers no equivalent color display to go with color-graphics equipped PCs? According to one rumor that came in ovar PC's transom, the explanation is that a PC Model 2 is in development that will hava a built-in, high resolution color display (an RGB-type monitor, says our rumor-monger).

We're not sure we believe this ona. But it seemed like a good opening for our special "Color" issue. And if it does prove true, remember . . . you heard it here first.

Double Headed Disk Drives

Upgrading a PC system to two-sided disk drives should be a simple matter, according to Tom Kornai of Intermedia Systams, a company that makes add-in circuit boards for the PC. Kornei has been poring over the disk controller electronics and says that both the

controller and disk drives have signal lines for "head select." He also says the Tandon drives IBM uses are equipped with "diode switching logic" for using two read/writa haads. Besides the extra head itself, Kornei thinks conversion to two-sided disks, which would double storaga capacity, would take only minor changes in "head end software." In passing, Kornei also comments, "everything is there for double density."

Buggy DOS?

Then, there is tha following bug in PC-DOS reported by an owner in the Pacific Northwest, who chooses to remain anonymous but will still see his name in print—on a $50 check.

At least two versions exist of release 1.00 of PC-DOS. There appears to be a bug in tha original version that IBM does not want to say anything about. I was having difficulty using DOS to transmit over the serial interface with a hardware handshake. Even though DOS was responding to the signal (on tha CTS or DSR pin), it was losing characters. The technician at ComputerLand did not know what to do, but one day he mysteriously received in the mail a disk labeled "Serial Printer" with no accompanying

PCOMMUNIQUES

documentation. We tried it and it fixed the problem. Thera is no new varsion number for this DOS; it is also lebeled "Version 1.00."

Here is a wey to test to see which varsion you hava: set the CTS pin in the serial interfece to "off" (hold it batween -3 and -15 volts). Then use COPY to send a file out the seriel port (e.g., "COPY TEST AUX:"). With the first version, the message "Aux I/O error" continually appeers, ebout once e second, until COPY gives the usual messege that a file hes been sent, which of course has not happened. (Every time "Aux f/O arror" appears, COPY thinks that a charecter has bean sent.) With the new version, efter antry of the COPY command, nothing happens. (DOS is waiting for the CTS line to change state.) You can gat out of the routine by hitting Control-Break, at which time the message "Aux 1/O error" appears once. There is still e problem with the DSR signel, evan with the new DOS. Whan DSR is "off," cherecters are egein lost at a rata of about one per second, but the error message does not appear. Let's look for a third version of "Varsion 1.00" thet will fix this!

Economy Route to Second Disk Drive

If you have do-it-yourself inclinotions, here's o suggestion on how to save up to $300 on odding o second disk drive to your PC.

The Tendon TM100-1 disk drive is very similer to the standard diskette drives used in the IBM Personal Computer. fn fact, it's indistinguisheble. I em tempted to suggest that it's exactly what IBM uses. fBM cherges $570 for tha drive. Tendon sells to distributors who are free to charge whatever they want, but recent edvertised prices range from $225 to $310. I bought one by mail-order and one week later I had the drive, carefully packed in popcorn and solid foam. Tha label on the right reer of mine reed: 661-3-R150 122F.

—Jonathan Seder
ProActive Systems
Peio Alto, California

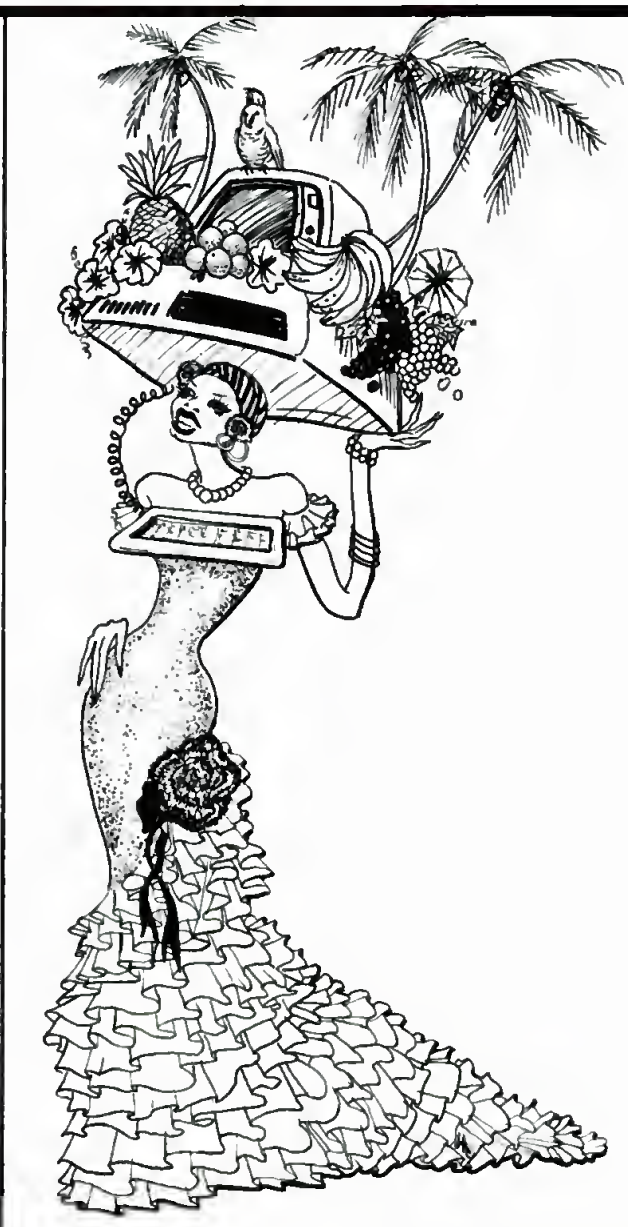
ASCII Me No Questions . . .

Since you ASCfI'd anyway, those five letters era an acronym for tha Americen Standard Code for Information Interchange. ASCII is a standard that tells computers how to get from the numeric codes it understends to tha letters, numbers and punctuetion you understand. As it heppens, ASCIf is not the stendard which IBM computers have traditionelly used; IBM went instead with a standard of its own, unpronouncaebly acronymed EBCDIC.

These codes are a little like religions: if you were born into IBM's family you went to the EBCDIC church, while personal computers universally learned ASCII's catechism.

But the PC, a schismetic from IBM tradition in so meny respects, was baptized en ASCII mechine—or so it seemed. Now, someone has been trying to tall our communications editor, Cliff Berney, thet the PC is really a closet EBCDICer. The significance is that PCs, if they do in fect have EBCDIC in their soul, could communicate more easily with bigger IBM brethren. Cliff's source says the PC operates with ASCfI only because a circuit inside it is doing constant translation, and if switched off the machine's true EBCDIC colors would immediately be revealed.

'We're not sure it matters, except to fanatics of the feiths. Any machine as smert es the PC could pray in ASCII and EBCDIC simultaneously and never miss a beat.



PC Goes Latin

We hod never considered hoving o "Travel" deportment in PC. But if we get ony more reports like the following, we'll have to stort thinking about it.

Against the advice of my computer salespeople in New York, I took my newly-purchased IBM Personal Computer to the province of Tucumán, in the northwestern part of Argentina. Tha placa I went to was 3,000 feet above sea level, 95 percent humidity, 95 degrees in the shade (it was summer there). The electricity wes 50 Hz, 220 volts, end subject to frequent "brownouts."

But with a simple 220-to-110 volt transformer, "Leticia" (as the IBM Personal Computer is lovingly celled there) was working the first day I arrived—Dec. 14, 1981. At the time I left the country to return to New York, my friend and f were programming end displeying optical systems. A program to celculate the lens in the Schmidt camera, which wa did just for fun, eppeered in the January issue of e professional optical megezina. I left the computer there, and I em told it is still working without problems.

José A. Velcinkas, PhD
New York City

Software Author Sounds Off

PC wos on the "cc:" list when on ongry softwore outhor fired off o blistering reply to some letters from IBM's external progrom submissions deportment. The exchonge begon when the outhor inquired about submitting programs for publicotion by IBM. In return, on informotional pocket orrived, but the outhor chose not to respond. A few months lotar, the outhor was included in o survey moiling inviting reoction to the first packet. This time, the outhor responded. Some choice excerpts . . .

I am taking the time to respond because, in your own inimitable IBM mannar, you seem to be concarned about communications and comments from microcomputer program authors.

fn Octobar, 1981, l recaivad an unsigned letter over your name, and 13 pages of extremaly formidabla lagal prose. As an attorney and Certified Public Accountant I can appreciate your company's naed to protect itself ageinst tha rest of the real world, but as a program author I decided that I didn't need tha obviously legalistic and impersonal (witness the unsigned and undated transmittal letter) approach that IBM had dacided to take with its potential authors. For this reason your letter was filed in a folder lebeled "IBM JOKE" for future referanca.

Today I received an offset follow-up letter that didn't avan include your neme, although it did have a date end your title . . . if you really went to communicate with softwara authors and even begin to plumb the depths of talent that is out hera you have got to look down from your lofty Fortune 5 position and make some attempt at PERSONAL communication. In case you hadn't noticed, the name of the product is the IBM PERSONAL Computer (even though I'm sure that you refer to it internally as the Model 5150).

I will now answer the questions listed in your questionnaire: (1) Yes, I own two fBM Personal Computers (in addition to seven other microcomputers). (2) Yes, f have published programs. The current count is 14, with 5 more to be released in the next 3 months. (3) No, l do not plan to submit a program to IBM. There are two basic reasons why. First, this lettar should have made its point that l am not interested (nor or most other bright softwera authors) in dealing with forms, unsigned letters, and genarally with the impersonality that IBM continues to exhibit.

Second, and probably more important—what's in it for me? What can IBM do that I can't do more effectively and less expensively by myself . . . ?

f have spent the better part of an hour writing this letter, and l hope and pray that it has not been wasted. I have spent this time because I truly believe that you have a superb product and that if you would spend a little bit of time and effort in "cleaning up your act" you could be as successful in the micro field as you have been in mainframas.

"Graphics will become as critical to the workstation of tomorrow as the keyboard is today."

—Microsoft's Bill Gates, at a seminar for software authors planning to write for the IBM PC.—MARCH 8, 1982

CLUB NEWS

IPCO INFO

iPCO stands for IBM Personal Computer Owners Group. ft was formed in Pittsburgh, Pennsylvania by two engineers and their wivas—Jim and Cindy Cookinham and Steve and Windy Hart. The stated purpose of the group is "to represent the owners and users of the iBM PC throughout the world."

iPCO publishes a newsletter called the "IPCO iNFO" and is setting up a Software Exchange program. Members of IPCO who contribute a program to the lPCO library will receiva four free programs of their choice (all on diskette).

Membership in IPCO is $15 a year for residants of the United States and $20 for Canadians. Prices for residents of other countries have not yet bean established.

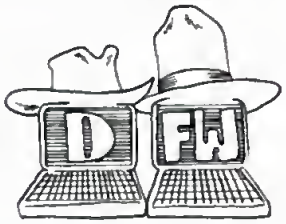
For more information, write to: IPCO, Inc., P.O. Box 10426, Pittsburgh, Pennsylvania 15234.

Hot Flash From Indianapolis

PC Editor-in-Chief David Bunnell found this message on his dask: "EXTRA! EXTRA! IBM PC Users Group formed in Indianapolis. Call David Reed at (317)259-7892. Plans call for a newsletter and monthly meatings."

It's SW-PCUG In Dallas-Fort Worth

The name of the Dallas-Fort Worth IBM PC Usars Group is SW-PCUG. Mambership is $30 a yaar and it includes a newsletter, monthly meetings, demonstrations, and assistance



with software and hardware problems. Also the group plans to distribute public domain softwere. Contect: Samual P. Cook, 309 Lincolnshire, Irving, Texas 75081, (214) 253-6979.

Hawaii Users Group

The first meeting of the Hawaii IBM PC Users Group was held February 16 in Honolulu. Membership in the

group is $2. For more information, write: Doug Long, 1750 Kalakaua, Suite 3-168, Honolulu, Hawaii 96826.

PCommuniques Pays

Are you in possession of information you think should appear in PCommuniques? PC pays up to $50 for each contribution published in this section. Submissions must be signed, but anonymity will be preserved upon request. All submissions become tha property of PC and are subject to editing. For payment, you must include an address and phone number. Write to "PCommuniques," 1528 frving Street, San Francisco, California 94122.

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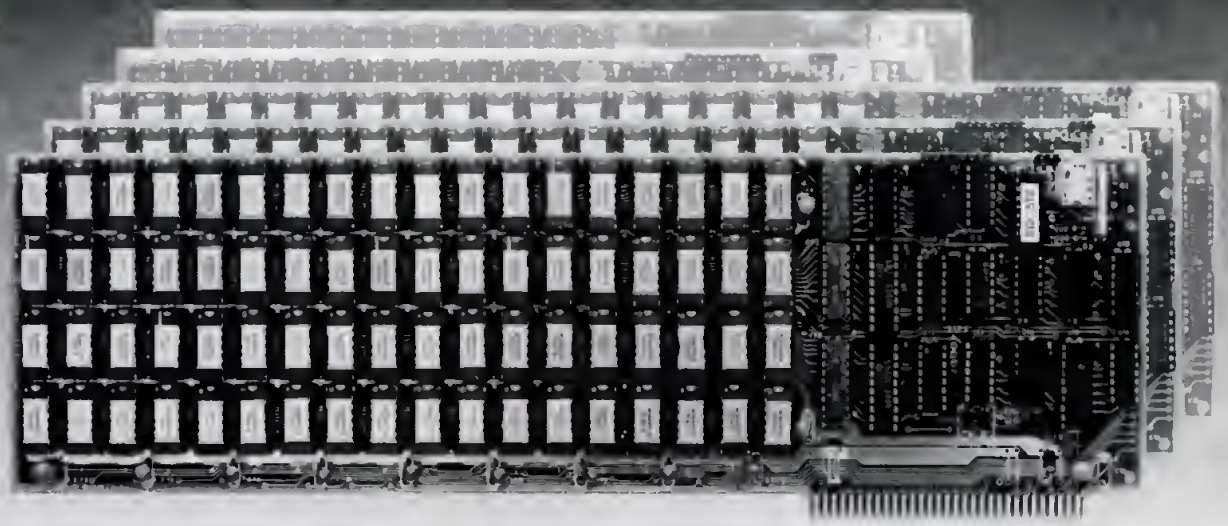

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Boca Diary

By David Bunnell

It's the week before Christmas. The charter issue of PC Magazine is in a mad flurry of typesetting, proofreading, & production. It is in a state which I call "flying upside down."

Illustration: Michael Sterkman
Art Direction: Fa

Thursday, December 17, 1981—

It's the week before Christmas, and the charter issue of *PC* magazine has reached that frenzied stage of production which I call "flying upside down."

However, two lucky *PC* staffers, the publisher and the photographer, have won a reprieve: we are flying—right-side-up—to Boca Raton, Florida, a resort area north of Miami. Many of the passengers seated around us are wearing palm tree prints and oversized, frivolous hats; it's easy to see that they're on their way to a vacation or a holiday reunion. However, we have a much more serious purpose in mind: we are on assignment to visit the birthplace of what could turn out to be the most dynamic electronic product of the decade the IBM Personal Computer.

Actually, I find this turn of events somewhat strange, although certainly in keeping with the gyrations of the personal computing business. Last August, when IBM announced the Personal Computer, I was sitting in my office at Osborne/McGraw-Hill, in Berkeley, California, staring out the window at people wind-surfing in the neighboring recreational pond. I was thinking about how much I liked being a book editor and how I might stick it out for a few years.

Tn tell the truth, the announcement didn't exactly cause me to jump out of my chair with excitement. "IBM, ho-hum," I thought. "Just another computer company jumping into the personal computer market."

What finally awakened my curiosity, however, was the attention the IBM Personal Computer was getting in the press and the impact it had on the people around me. None of my associates wanted to talk about the Apple III or the Osborne I computer anymore, nor did they want to fantasize about writing the next super-selling program. They didn't even care about the movies.

All they wanted to talk about was the IBM Personal Computer—what it was, its potential and limitations, and, most nf all, the impact IBM wnuld have on the business of personal computing. Would the major shareholders of Apple quickly sell their stock and retire to Hawaii? Would Tandy go back into the leather business? Did Commodore even know yet? Those were the burning questions of the day.

Friday, December 18, 1981—

I am blown away. What to me is a hurricane, but to Floridians would be a mere wind storm, is shaking the walls and windows of my ocean-front motel room far more fiercely than a California earthquake. Also, the phones are out, but that's not what I'm talking about.

What I am talking about is our visit to the IBM Personal Computing division, which has turned out to be a major event and one which I am very pleased and snmewhat surprised about.

First of all, the place itself is a standard gray IBM building situated in a rural setting just off the freeway on the inland side of Boca Raton. We were there from nine in the morning to around six in the evening, during which time I talked with many of the top people involved in the design, production, and marketing of the IBM personal computer. We also got a fascinating tour of both the "old" IBM factory (where the PC is currently manufactured) and the newly built IBM PC factnry, which, by all appearances, will be in operation within a few months.

Our guide and hostess for the day was Jeanette Maher, the Senior Information Representative for the Personal Computer division. Jeanette is a

very competent professional who knows how to conduct business in a friendly manner. In fact, all tha IBMers I met that day seemed to be cut from the same cloth: entirely professional but neither stuffy nor arrogant. Also, I noticed that they really care about excellence, taking pride in both their individual and the company's accomplishments.

Jeanette and her associate, Hal Jennings, Marketing Support Representative (no relation to "HAL"), greeted us in the reception area and led us to the nearby Personal Computer demonstration room. There we spent the morning in meetings with the key members of the development team that made the IBM Personal Computer. (In between these visits, we played with the new IBM math games, including *Beono* and *Rockets*.)

Our first two visitors were Bill Sydnes, Engineering Manager, Entry Systems Business, and David Bradley, Manager of Entry Systems Business Architecture. I asked them about the open-bus structure of the Personal Computer and how they felt about third-party companies selling such things as IBM PC-compatible memory boards. Sydnes told me that the PC was definitely "designed to be open." He and Bradley were very interested in hearing about these products and they were fascinated that so many were already available.

They were particularly intrigued by Tecmar, the Cleveland engineering company which, at that time, had already developed more than 20 options, including a PC expansion box. I confess that I was taken aback by this. Although I came to Boca with few preconceived notions, I was surprised to learn that IBM would welcome competition.

Then Sydnes said something which I found stunning: "The definition of a personal computer is third-party hardware and software."

I told him that I appreciated the open-bus design but questioned there being only five slots for plug-in boards. He said that it was a "design trade-off" having to do with the size of the power supply in relation to its capacity.

Sydnes pointed out that the IBM Personal Computer has the capacity to emulate the IBM 32/70 mainframe, and thus he expects the IBM Personal Computer to find its way into many major corporations where it will be used both as a stand-alone unit and as an intelligent terminal hooked to the 32/70.

Obviously proud of the PC achievement, Sydnes said that the PC has been designed for maximum flexibility and that it could easily be interfaced to any kind of printer or display. (Some PC users might dispute the word "easily.")

Following my conversations with Sydnes and Bradley—whose most memorable quote was that he was "not at all surprised" by the success the IBM PC is having—I met with Senior Programmer Mel Hallerman and Dave Stuerwald, Manager, Entry Systems Business, Programming and Publications. These two gentlemen threw some light on the operating system question. I asked them which of the three operating systems—DOS, CP/M-86, or p-System—would be used the most. Without the slightest hesitation, Stuerwald replied that the "great majority of users will use DOS" because they will want to take advantage of its "native interpreter," Microsoft BASIC.

"If code is written in Microsoft BASIC, then it doesn't matter what the CPU is," Stuerwald further explained.

Hallerman added that while all three operating systems "have value for us" and that there will be "a nice market for all of them," the "overwhelming majority will be DOS-based."

Next, I met with the man who actually designed the IBM Personal Computer: David O'Connor, Manager of Systems Architecture.

Mr. O'Connor, who is an extremely bright and articulate fellow,

seemed proudest of the "human interface" aspects of his design, such as the fact that open manuals can rest on the keyboard and that it fits into office furniture (the main unit can be installed in a drawer, which explains why the keyboard cord is plugged in at the back).

I asked him when they started the Personal Computer project and he said that it was in July, 1980.

He volunteered that there was an "unbelievable level of enthusiasm" during the time of the project and that indeed, there were lots of days when "I had to tell people to go home."

The design of the IBM PC is a "conservative design" and O'Connor freely admitted that when designing physical packaging, there are always "compromises" to be made.

I asked O'Connor why IBM chose to use a 16-bit microprocessor rather than a standard 8-bit machine. His answer to this question was that there isn't anything very challenging about 8-bit machines. "Can you find anything they haven't tried?" he asked. "On the other hand, 16-bit machines have the potential for far more commercial and design applications."

O'Connor believes that color graphics will rapidly become important in business applications. He is hoping someone will design a color-card adapter with an attachment for a light pen so that users could paint or draw color directly on the screen.

"If color is so important," I asked him, "how come it wasn't included as a standard option? Why does it require a separate interface board?"

O'Connor's answer was that it was done separately so that the PC can have two monitors operating in tandem. The color monitor would be used for graphics while the monochrome display would be used for menus.

Before departing for his busy office, he pointedly took time to express his belief in the importance of third-party software authors' employing a keyboard usage consistent with that in other programs. I assured him that I would make our readers aware of his concern, and that *PC* also believes in maintaining keyboard standards.

Following the meeting with O'Connor, we left the gray building to have lunch with Jeanette at a nearby restaurant, where I learned that she had been an IBMer for 12 years and that she had a wealth of experience in the public relations field. Jeanette moved from New York to Boca Raton for the Personal Computing Project, and we discussed the drastic change in environment that this had brought about.

Upon returning, I had a fascinating interview with Philip D. (Don) Estridge, Division Director, Entry Systems Business Unit, who is in charge of the entire project and who presently heads the Personal Computer division. Estridge, who is a lanky, imposing figure, seemed as though he had a thousand things on his mind, which I am sure he did. Still, he projected a take-charge attitude and quickly warmed to my questions. In fact, he was ready with his answers much faster than I was with my questions. I found him such an interesting person that the minute I returned to the motel, I had to play the tape and transcribe the highlights of our conversation, which follow:

Estridge

PC (that's me!): Why did IBM enter the personal computing market?

Estridge: The simplest reason is that it represents an opportunity for business. With the explosion that occurred between 1977 and 1979, it became enough of a business to be interesting.

The second reason is a little more difficult to pin down. We believed we could build a machine that would be something special—so special that people who hadn't used IBM equipment before would use it. Also, our own employees would have access to a personal computer; it would give an outlet to the programming creativity that was inherent in the IBM population.

Building lots of PCs

PC: Why did you decide to go with third-party software?

Estridge: We believed that a very wide array of software would be one of the key factors in the widespread use of the Personal Computer. There is no way that a single company could produce that much software; even if it were possible, it would take too long. So we needed to have the participation of other software authors and companies.

Another reason was a little more pragmatic: we didn't think we could introduce a product that could out-BASIC Microsoft's BASIC. We would have to out-BASIC Microsoft and out-VisiCalc VisiCorp and out-Peachtree Peechtree—end you just can't da thet. They have esteblished good products and it didn't make any sense for us to ignore that. Quite the contrary; we really wantad their participation.

PC: Are you surprised by the response to the IBM PC?

Estridge: We wanted to fit lnto what we believed was the existing lntra-structure of software hauses, authars, hardwere vendars, and retail distribution channels that had arisen. We were very anxious to get people to understand that we really did want to fit in and that we weren't trying to set rules for others to live by. We are very surprised that this view seems to be getting across well. No, "surprised" is not really the right word; "pleased" is better.

From the standpoint of the success af the machine, the demand far it is very strong. We always thought it would be, and it is every bit as strong as we'd hoped for.

PC: How mony machines will you ship in 1982?

Estridge: Lots!

PC: Well, I tried.

(Things moy be different ot IBM with regords to the Personol Computer project but getting projections of, or informotion obout, future products is impossible. Jeanette scolded me mildly for persisting in osking such questions, but I continued to do so in the hope thot something might slip out. It didn't.)

PC: In develaping your strategy, did yau clasely examine Apple's strategy and the reasons for their success?

Estridge: No, we didn't. We didn't look closely at any single product. Insteed, we looked closely at what purchasers were doing. We asked these kinds of questions: Why did the customer buy? What machine capabilities were the customers using? Why would people want to buy a personal computer in the future? If you hadn't purchased one yet, what was it you were waiting for?

PC: Nonetheless, many industry onolyses conclude that the IBM Personal Computer is a "Super-Apple" because it has high-resolutian graphics, music, ond other similar features. Also, it seems thot IBM's promotional compaign is similar to Apple's, is perhops following Apple's leod.

Estridge: Well, we certainly would not call it a Super-Apple. We think there are a lot of features in the machine that stand on their own. It has some similarity to other machines but there are significant differences as well.

As far as promotion goes, we wanted to make sure that people knew we had this machine, so we began our advertising effort with the most eye-catching, appealing awareness campaign we could devise. If that makes our promotion look like someone else's, it is an accident.

PC: Some of our subscribers have commented thot they wish IBM had provided better word processing, thot is, u more odvonced packuge thun EosyWriter.

Estridge: We wanted a middle-of-the-road word processor, one that would function relatively well for a private individual and also offer a minimum level of function for a professional. We also wanted one that would be affordable. We knew there were packages that had more functions and were more expensive, and we knew there were packages that had fewer functions and were less expensive. We just made our choice.

PC: Can you share with our readers some more about the project itself and how you were able to put it together in just a little over a year?

Estridge: Gee, it seems like only yesterday. There were a lot of people at IBM—not just in the technical areas, but throughout the company—who wanted IBM to build a personal computer. There was a high level of enthusiasm: if you became a member of the project that enthusiasm carried over into the project. From the beginning, we knew what we wanted to build so we didn't spin our wheels asking, "Is this the thing we really want to do?" I think it has already been shown that we were more on the track than off it. Then we just went to work—and didn't eat or sleep for a year.

I don't remember the exact quote, but someone said that it was "One percent inspiration and 99 percent perspiration."

[Note: It was said by Thomas Edison, who doesn't work for IBM.—Ed.]

PC: Can you share with us any of your fears before IBM made the announcement?

Estridge: Well, you never know for certain how people are going to react to a product, so there is a great deal of uncertainty about its probable success. We received a great deal of support from people in the software community, such as Microsoft and Personal Software, who told us, "You've got a good machine," and our advertising people told us we had a good machine. But, what about the people who were going to express their support in terms of dollars and cents? That part we didn't know.

Also, what if we couldn't build it? The Personal Computer constitutes a lot of product and a lot of volume in a short time. Never before has any division of IBM tried to build so many computers. What if we couldn't do it? What if one of our suppliers ran into a problem that none of us had anticipated? There were any number of unknowns.

PC: Aren't you still facing some of these manufacturing and supply questions?

Estridge: No, the question today is how quickly we can build them, not *IF* we can build them. We are shipping them and the quality is just superb. Our attention has turned to building enough so that there can be off-the-shelf delivery.

PC: Will IBM continue to build the machine in Boca Raton or will there be other locations?

Estridge: Well, we do build at Boca right now. We are always asking ourselves whether we are doing the best job. I would say "forever" and "always" are things that never happen at IBM.

PC: That is a quote you could apply to the whole PC project.

Estridge: We are very quick to change our plans if we find a better way.

PC: Tell us why you called it the Personal Computer.

Estridge: Because that's what it is.

PC: Why doesn't it have a model number?

Estridge: We thought that putting a model number on it would cause confusion about what the machine was for, so we just didn't do it.

PC: But doesn't that create a problem with future machines?

Estridge: It doesn't bother me. Someone asked me what the next IBM

personal computer would be called, and I said, "The IBM Personal Computer." I don't know why there should be anything hut the name.

PC: Were there olternatives?

Estridge: There are always alternatives.

PC: Can you tell us what some of the other leading candidates were?

Estridge: We never talk about the others.

PC: Are you concerned about software piracy?

Estridge: Our plan is to protect the software in a simple way: by impressing users with the fact that unauthorized copying is illegal. If we were to find it being done flagrantly, we would probably take clear action. It is against the law, and it is stealing our assets. Beyond that, software piracy takes all the fun out of the very reason software authors want to participate, which is to be creative and to have a chance to strike it rich through royalties. It doesn't make sense.

PC: Still, even with copy protection, it is pretty easy to copy o diskette.

Estridge: But it is wrong, and it is disappointing to me to think that there are people who knowingly do it. It is just a form of thievery. I think it is the single greatest threat to the viability of these machines.

PC: Do you think the price of softwore is o foctor?

Estridge: I don't know if you were at the recent Boston Computer Society meeting, but Mike Markkula, from Apple, talked about something that turned out to be somewhat controversial. He said, in effect, "Why don't we forget about having copy protection, let's just don't do it. That way, we'll implement—that is, we'll not copy protect—the code hut price everything the same. We could price it on the basis of the cost of manufacturing the diskettes rather than on the basis of the value of the material stored on them." This approach would be similar to that used in the record industry and there is a lot of merit to this idea, but none of the software authors will agree to it.

PC: Maybe when the volume goes up?

Estridge: Only when people stop copying. It has nothing to do with volume. People have to stop copying.

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That was an intense interview; following it, I was pretty depleted. However, the highlight of our Boca journey was yet to come.

Next there were brief discussions with Manager, Entry Systems Business, Sales and Service, "Sparky" Sparks, and Staff Communications Specialist Dave McGovern. We talked mostly about the new market directions IBM is taking with the PC. Sparky assured me that IBM will soon be announcing new retail outlets for its Personal Computer, but he was careful not to say when or where—or especially, how many.

Then Jeanette introduced me to Dan Wilkie, a tall, athletic-looking man who is the Manufacturing Manager. He was in a very relaxed, jovial mood. I discovered the reason for this attitude when I shook his hand, as he happily announced that that very day, the IBM PC manufacturing division had reached its production goal for 1981.

Naturally, I asked him what the production goal was and with a smile he declined to tell me. But he assured me, and I later verified with my own eyes, that (as Estridge would say) it was "a lot."

Wilkie had come to take us on a tour of the two manufacturing facilities, both the new plant (recently constructed but not yet in use) and the old, which was in triple-shift production.

Both manufacturing plants are approximately five miles from the division's headquarters. We drove to the sites in three cars, caravan-style. Wilkie lead the way in his Corvette Stingray—not the kind of car I'd expect an IBM executive to drive, but then, the Personal Computing division, I'm finding, is really something quite special and unorthodox, especially for IBM—and I mean that in a totally positive way.

Jeanatte followed Wilkie in her car, and we followed Jeanette. It was a good time to collect a few good thoughts and clear some of the old memory locations which, in my mind, are well under 256K.

"This is really exciting," I remember thinking.

Our first stop was at the new plant, a big, long, gray concrete building with lots of windows but otherwise nondescript as far as other manufacturing facilities I have seen.

Dan Wilkie

Dan Wilkie was waiting for us at the front, and he let us in by slipping a plastic card into a slot on the door. The building was empty and we were the only ones there. From the looks of it, only tha finishing touches need be made before they could move into it. They were still setting up portions of the assembly lines, which Wilkia told us would begin with one "fully automated" line and one semi-automated one which will be converted when all the automation bugs are worked out. Dan told us that the interior of this building was 100,000 square feet, including 25,000 for manufacturing (concrete figures at last! I wrote these down feverishly).

Wilkie began our PC tour in a huge parts room where he explained to us that the manufacturing procedure at the Personal Computer plant is a lot like a kit-building process. In other words, it is not done from the ground up—the circuit boards and tha keyboards come preassembled from other plants. Hare they are packaged togethar with the IBM chassis, single-disk drive, and 48K mamory. All IBM PCs currently begin in this stage, which should tell you something about the number being sold with cassette interfaces to hook to home tv sets.

Next, we walked the length of the automated line, where Wilkie stopped at various key points to explain how IBM Personal Computers are mada, tested, and packed in boxes ready for shipping (there are nine full-size loading docks in the back of the building and as he talked, I fantasized one semi-truck after another loading up with PC's).

Interestingly enough, each IBM PC is built by a single worker who, more or iess, has his signature on it, since IBM can use the bar codes on the back to identify the worker who assembled tha machine.

The first part of the process is the CPU assembly, which involves installing the CPU circuit board along the bottom of the chassis.

Onca the units are assembled, they are plugged into a robot tester which does an automatic power test under the watchful eye of an IBM Series 1 computer. Here a keyboard simulation test is performed and the printer interface is tested. Next, the PC is moved by a "pick and place" robot and placed on a huge, metal-frame carousel where up to 750 machines can be "burned in" at one time. This test includes a "high pot" test which should identify any weak components.

Following the burn-in, the machine is removed from the carousel (again, by a robot) and plugged back into the robot test for a second automatic power test. Following this, it is transferred to the end of the line, where yet another robot picks it up and puts it into its shipping box. (This carton is designed to withstand a 36" drop on all sides and corners.)

Following our tour of this fascinating new factory, we went to the old factory. While it lacked the automation features of the new building, it was nonetheless remarkably efficient and productive. As a mattar of record, the first part of this building we saw was tha large shipping area, where several thousand PCs were in stacks ready for shipment.

Eh gads, I thought, IBM is really serious about making these things.

The biggest treat for us at the old facility was watching IBM technicians as they assembled and tested Personal Computers, doing very much the same assembly procedure that will be done in tha naw building. Though I hava littla basis by which to judge, in my view, they appeared to be extremely competent and proficient. Many of them joked with Wilkie as we went down the line and they posed for photographs.

Our IBM day concluded in the parking lot of this manufacturing plant as the sun was setting. It was past six on a Friday evening, and I'm sure Dan and Jeanette were anxious to get home for the weekend. We thanked them on behalf of ourselves and our readers—who will hopefully benefit from this Boca trip at least half as much as we have.

The wind is still shaking my windows. It is 6 a.m. and as I peer out the curtains I am astonished that it is a clear day. The morning sun is rising over the Atlantic. It shines hrightly on Boca Raton.

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CRANKING UP THE SOFTWARE MACHINE

How IBM is working to bring plenty of PC software to market.

It's called, simply enough, IBM's Personal Computer Software Publishing Department.

And to authors who are seeking fame and fortune by writing programs for use with the IBM Personal Computer, it's an easy way to approach the giant firm. If the software passes IBM's tests, IBM will publish, market and distribute it.

Let the program author beware, however, for he or she has to play by IBM's rules. As of this writing, while the sky's the limit on fame, "fortune" will not exceed $100,000—unless the software author can convince IBM an exception is justified.

The $100,000 limit, written into IBM's standard "Acceptance Agreement," has resulted in complaints from some hopeful authors, who also don't like another term which says, "IBM's obligation to pay royalties to you shall end when four (4) years have elapsed from the date of the general availablitity from IBM of a program product based on the Program," should that occur before the $100,000 limit is reached.

Nevertheless, the stated limitations have not discouraged many hopeful application writers.

Ed J. Marill, manager of application planning for the IBM Personal Computer, who oversees the Software Publishing Department, said his program reviewers "are beginning to have a significant number of submissions."

IBM historically does not disclose volumes or numbers of employees engaged in any specific activity, but Mr. Marill said he was pleased thus far and is seeing "a satisfactory level" of submissions from outside IBM, as well as from IBM employees.

As of this writing, IBM has not announced any programs that were processed via the Personal Computer Software Publishing Department route. Previously announced programs resulted from separately arranged agreements between IBM and software vendors, including Microsoft; Personal Software, Inc.; and Peachtree Software, Inc., to name just three of the main ones.

And because other alternatives exist to IBM's Software Publishing Department, program authors should explore them before signing any agreement with IBM. Even IBM's standard initial agreement—needed simply to give the company permission to review the prospective program—contains a provision that prevents the writer from changing his or her mind later. It states:

"If IBM accepts your program for possible use and marketing, you agree that you will enter into an Aceptance (sic) Agreement with IBM in the form provided herewith." (IBM said it plans to fix the spelling of "aceptance" when it prints new forms.)

"... the form provided herewith" is the standard "Acceptance Agreement," discussed previously, with the $100,000 limitation.

IBM has good reasons for getting the writer to commit prior to actual acceptance. If it didn't, and the program author had a change of heart and decided to have it published by another vendor, IBM would be what is known in industry parlance as "contaminated" with knowledge of the program's details. This would make IBM's legal position more difficult were it to introduce a product later with similar function, and, in fact, would give IBM pause about bringing such a product to the marketplace at all.

Let's look at the submission procedure, and some other important considerations would-be writers should keep in mind.

Contacting the Department

Organizationally, the Software Publishing Department is located at IBM's Entry Systems Business (Personal Computer) headquarters near Boca Raton (actually Delray Beach), Florida, reporting to Don Estridge, ESB director. That's where the key people are located who actually review the content of submissions, and experience with personal computers was key when IBM was recruiting internally at the time the department was created.

However, like large mainframes, the Florida unit has a "front end" which aspiring authors must contact first. Those interested in exploring the IBM route should write: IBM Personal Computer Software Submissions, Dept. 765, Armonk, New York 10504. By return mail, authors will receive information packets, including the blank agreements, submission instructions and a list of helpful "things to consider" when writing a program.

While seemingly bureaucratic, IBM again has good reasons for this "front end."

Long before the Personal Computer, in fact for most of IBM's existence, people and other companies have approached it with ideas, including new inventions and programs. The same corporate function experienced in handling past overtures is now also the Personal Computer Software Submissions "front end." Simply stated, its objective is to assure that the

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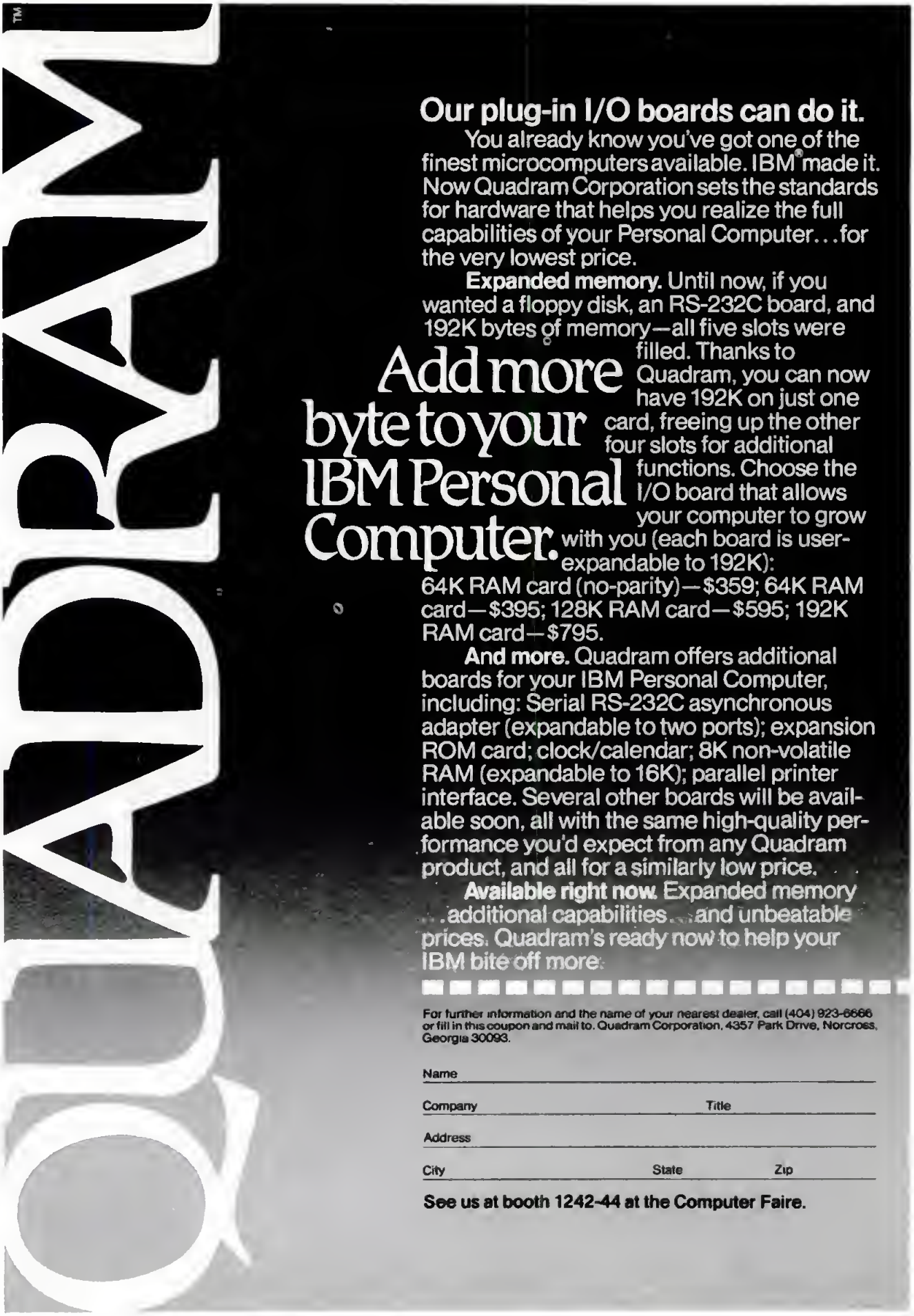

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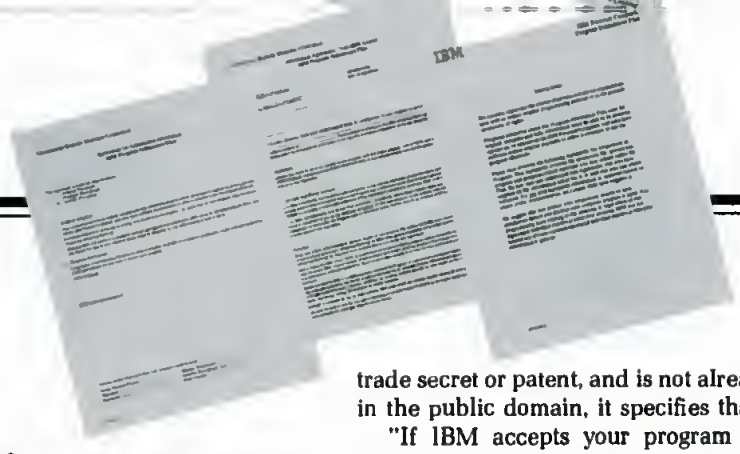

IBM's Agreement: An Overview

AGREEMENT FOR SUBMISSION OF PROGRAM

The agreement contains three parts: (1) General Provisions; (2) Program Description; and (3) Specific Provisions.

The *General Provisions* section is brief and primarily advises authors that their submission should be original, complete and fully operational.

(Ed J. Marill, manager of application planning for the IBM Personal Computer, said he didn't feel that submissions necessarily had to be a completely finished program—but at least in the prototype state, far enough along to show its function, ease of use, prompts and so on.)

Format isn't specified, other than saying the submission "must be entirely in writing." Mr. Marill emphasized that content was the most important consideration.

The *Specific Provisions* section is perhaps the most interesting. In addition to asking the author's assurance that he or she is of legal age and that the program does not infringe on any copyright, trade secret or patent, and is not already in the public domain, it specifies that:

"If IBM accepts your program for possible use and marketing, you agree that you will enter into an Acceptance Agreement with IBM in the form provided herewith."

IBM wants that up-front commitment, Mr. Marill explained, because it wants to avoid any possible problems that might later be caused if a writer should give it to another party after IBM had considerable knowledge of the detail in the program.

The same section also asks the author to agree that "$100,000 shall be the absolute limit of IBM's liability in the event of any controversy arising between you and IBM with respect to this Agreement, the Acceptance Agreement, or your submission and/or its subject matter."

ACCEPTANCE AGREEMENT: NON-IBM AUTHOR

Once IBM has approved a program product submitted by an outside author, a representative of IBM will sign this agreement.

It grants IBM, in effect, the right to market or license it however the company sees fit. In turn, IBM agrees to pay a 15 percent royalty.

However, a provision under the Royalty Section has resulted in complaints. It says:

"IBM's obligation to pay royalties to you shall end when four (4) years have elapsed from the date of the general availability from IBM of a program product based on the Program, or when the total of all royalties paid by IBM to you equals one hundred thousand dollars ($100,000.00), whichever occurs first. No further payments of any kind shall then be due to you.

Mr. Marill said IBM felt the $100,000 limitation seemed "fair and reasonable." He said the company would, however, "be willing to react if it's the right thing to do," meaning that if any author felt that, in his or her instance, this was unfair, IBM would be willing to listen—and possibly change the number.

Elsewhere, the agreement calls for the author to "enforce your rights against infringers of your copyright, to the extent reasonable under the circumstances . . ." While unspecified, it leaves the impression that IBM could be expected to assist if someone infringed on the copyright.

In a section called "Conversion and Maintenance," the author is alerted that, for the first four years of the program's general availability from IBM, he or she will be expected to "use your best efforts" to verify and correct errors "within ten (10) days after each notification."

—Jim Strothman

ideas of the inventor, or program author, aren't mishandled in a way that could later hurt either party.

"Any corporation has a problem when looking at ideas from the outside," acknowledges Mr. Marill, "so we must use cautious language in the agreements, for example, which doesn't compromise ideas—especially when similar ideas might be coming from the inside."

The initial "Agreement for Submission of Program" asks for the "minimum information" needed for initial screening, he said.

Mr. Marill said that, once IBM receives a signed "Agreement for Submission," it has a self-imposed goal of deciding in six weeks whether to approve or not approve the proposal. This time could be longer, or shorter, however, depending on the complexity of the review process and the clarity of the submission.

While a submission does not have to be a completely finished program, "it should be at least in the prototype state," he said. "We don't want just ideas—we want some level of implementation that shows its function. We want to be able to demonstrate, for example, that it's friendly, easy to use, that good prompts come up on the screen and so on."

During the review process, the IBM evaluators likely will get a second or third opinion within the department, he said. If the application is a specialized one, such as for real estate or medicine, and expertise is not within the department, a specialist will be found, he assured. With its larger computer line, IBM has developed software expertise in a vast assortment of applications.

While copyright and other legal concerns are covered in the review process, the main effort is put behind the program's content—"Is it worth investing money on?", the department head said.

Mr. Marill and the "Things to Consider" instruction sheet that's provided with the information packet emphasized that programs are desired which are original, unique, useful and "friendly," as well as well designed and supported by adequate publications.

Things Writers Should Consider

The "Things to Consider" sheet says:

"Programs with the best chance of being published will be easy to use, offer a better way to accomplish a task, be entertaining, or will provide something special or unique to the end-user. The emphasis is on quality, wide appeal and uniqueness."

It notes that "of particular interest" is software in the following categories: (1) home/personal finance; (2) education; (3) recreation (games); (4) business/professional; and (5) software development tools.

Mr. Marill emphasized that IBM is "wide open" to program applications in other areas. Of submissions received to date, no particular trends have been noticed, he said, nor have any particular weaknesses or strengths been generally identified.

In the home/personal finance category, IBM is looking for everything from simple data management to sophisticated systems for people with complex financial investments. In education, self-improvement courses are of interest. Entertainment can vary from arcade-type games to sophisticated games, such as chess.

Programs for business and professional users could be of special interest. For while IBM is letting Sears and ComputerLand stores, plus IBM Product Centers, do most of the marketing to individuals, its main marketing effort to large business users will be done through IBM's two big marketing divisions—one focusing on large national accounts and the other on smaller businesses.

The IBM Personal Computer is expected to compete very well in the business marketplace, and this would make it significantly more attractive for would-be authors to develop business applications.

The "Things to Consider" instruction sheet encourages writers to ask such questions as:

- What makes your program special:
- What makes your program unique? A better or faster way to do a job; a method to solve a problem that has not been solved; an easy to understand user guide?
- Does your program take the user into account?
- Are the following used properly, and are they appropriate to the user and your application? Color; Sound; Screen design; Help screens and instructions; Adequate error messages; Consistency; Speed; Publications.
- Does your program let users make mistakes and still go on?
- Is your user guide adequate for us to evaluate your program? For the users to learn about and utilize it easily?
- Does your program do the user's whole job? Does the program design allow for expansion?

Mr. Marill said that, while he expected BASIC to continue to be a popularly used language, the key is to produce a program that's friendly and easy to use. IBM has announced early availability of a PC Macro Assembler by MicroSoft, for developing programs in BASIC, Pascal and FORTRAN; a MicroSoft FORTRAN compiler for writing programs in a version of FORTRAN-77, a popular scientific and engineering language; and program development aids from SofTech Microsystems, Inc., called the USCD p-System (Version IV) with UCSD Pascal and FORTRAN-77.

Once a program submission is approved as an IBM-endorsed product by the Software Publishing Department, it will be promoted and distributed "through the same channels" as current software, Mr. Marill said.

Software for the Personal Computer is available only at the same authorized outlets where hardware is sold. It is not available via mail order, for example.

Jim Strothmon is a syndicated columnist whose reports on new technology are distributed by the Register & Tribune Syndicate. Before starting his column, he had been employed by IBM for several years.

3 Choose from Intelligent Printers for your IBM Personal Computer

The NEC Spinwriter is an excellent printer. But you need more— More interfacing choices, more RAM buffer, and more word processing features. So we installed a specially designed interface and renamed the printer SELLUM I. For the past 2 years it's been outselling all expectations.

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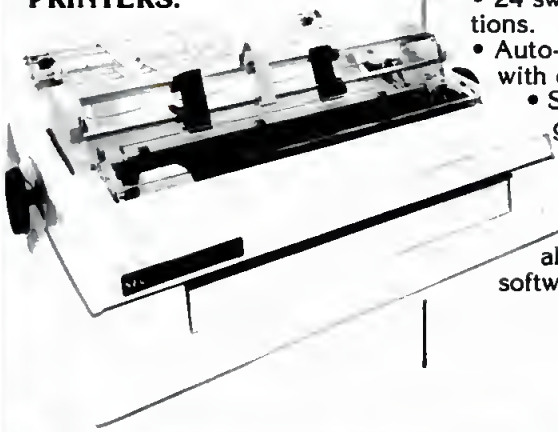

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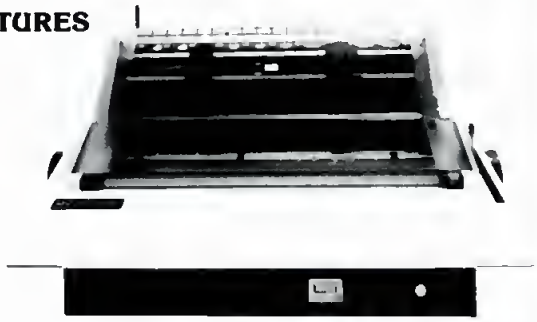

- Complete word processing features, standard.
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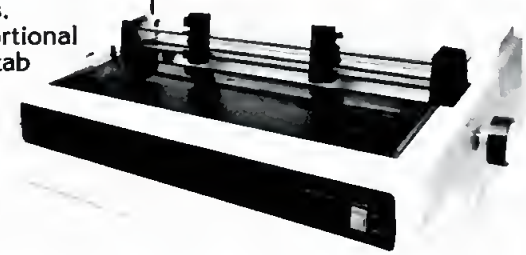

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You direct THE PROGRAMMER via a series of "menus". Each menu presents a question and a list of the available choices. You simply input the number of the function you want, and THE PROGRAMMER writes the corresponding BASIC program lines. The finished product is automatically stored on the disk, from which it can be copied on another disk for later use.

WHAT CAN THE PROGRAMMER DO FOR YOU?

THE PROGRAMMER can write a _____ (choose the correct response.)

a. data-base program to develop and update a mailing list or keep track of catalog items in your inventory.
b. graphics generator program.
c. program to create sounds or music.
d. customized small business accounting system.
e. program to interface with another computer device.
f. word processing program to print department reports.
g. all of the above, and more.

The correct response to this sample menu is "g". The "bottom line" is that THE PROGRAMMER will write a program for any purpose. The possibilities are limited only by your imagination. Once a program is completed it can be saved on a disk, allowing you to write additional programs. THE PROGRAMMER will not create the ideas, but will permit you to quickly and easily implement any programming ideas you have.

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COMPETITION

Carl Warren

HIGH NOON

Tandy calls out IBM

In a setting replete with ten gallon hats and bottles of Lone Star beer, Tandy Corporation's Radio Shack division this past January issued a challenge to IBM by introducing a powerful new computer dubbed the "TRS-80 Model 16." At $4,995 for the basic system, the Model 16 is priced in the same range as typical business configurations of the IBM Personal Computer and, by some measures, could be viewed as offering more capacity for the money.

Like the IBM PC, the Model 16 is based on a more advanced microprocessor than those used in Tandy's and other companies' earlier microcomputers. But instead of the Intel 8088 used in IBM's PC, the Fort Worth, Texas, firm chose the more powerful and easier to program Motorola 68000. In addition, the intreped Texans developed a dual-processor design that puts an 8-bit Z-80A microchip in tandem with the 16-bit 68000. When the 16-bit processor is in control, the smaller chip handles input and output operations; but the Z-80A can also serve as the primary processor, enabling the Model 16 to use software already created for Tandy's TRS-80 Model II, upon which the newer machine is patterned.

A basic Model 16 system consists of:

—A single disk drive capable of storing 1.25 million characters (megabytes) of information;

—128 thousand characters of main storage, expandable to 512 thousand characters;

—Connection ports for adding printers, plotters, and telephone communication devices (modems);

—Expansion slots for adding such items as the $499 high-resolution graphics board.

Besides all these enticing attributes, the Model 16 is capable of supporting multiple users and tasks. By connecting two additional terminals to it, the Model 16 can serve as the primary host for three users simultaneously. (Radio Shack introduced an inexpensive terminal at the same time as the Model 16.) Tandy's new computer is also equipped to communicate via the ARCNET local area network system announced last September.

Why Only Two Additional Users

Interestingly, the multiple user feature is among the ones most damned by industry observers. Many feel that two aren't

enough. But Dr. John D. Patterson, Tandy/Radio Shack's vice president of research and development, counters that adding users tends to degrade the system's performance. Patterson believes it is better to add additional user stations either through the ARCNET, which can support any number of users and peripheral devices, or through another newly-announced product, the Network III. This $599 device is designed to support as many as sixteen users in a round-robin fashion. Its potential significance is great, but it was the least touted of the products introduced.

Although the Model 16 design is capable of supporting extra users and handling several tasks, such as allowing printing of a document while you're working on another job, these powers are not currently available. And some expect they may be a long time in coming. According to Don Williams, publisher and editor of the respected '68' *Micro Journal*, it appears that Radio Shack was premature in their offering.

More Than Just A Big Machine

Williams might be correct in his assessment if Tandy had elected to lump all their efforts into one product, as did IBM. But Tandy has taken the empty-your-six-shooter approach to introducing new items.

Besides the powerful desktop computer system, its add-on graphics system, and the Network III, Radio Shack also unveiled an updated version of its hand-held personal computer. This computer, called the TRS-60 PC-2, costs $279.95 and is essentially a TRS-80 Model I that fits in your hand. It can have as much as 18,000 characters of storage and, like the Model 16, it can connect to the ARCNET. It can also ba used to communicate remotely to a Model 16.

This total product offering, according to Tandy's president, John Roach, is a way of reaching the small business audience. Roach says Radio Shack now has something for every application and can provide an upgrade path that is both supported and inexpensive. This is something they apparently aren't convinced IBM can do.

But What About IBM?

Of course, IBM hasn't been resting on its laurels either. Already, reports have it that the Personal Computer has sold in excess of 50,000 units, and that an ex-

pected 200,000-plus will be sold by year-end. Sources at Sears and ComputerLand reported that the machine isn't gathering any dust on the shelves, but refused to release any concrete figures on total sales.

Although Tandy introduced a host of products to surround the Model 16, IBM is relying in part on outside sources to add additional value. For example, Tecmar, of Cleveland, Ohio, has already created mora than twenty add-on products for IBM's machina. According to Tacmar's vice president of marketing, Dava Wertman, the company currently has no plans to support the Tandy machine. Microsoft Corporation's Consumer Products Division is also gearing up to support the IBM machine with both hardware and software. Microsoft's Vern Raburn says that the company is preparing an add-in memory board, with special software to treat it like a disk storage system. Raburn says this product will speed up the entire operation of iBM's machine, and make it stand toe-to-toe with any available microcomputer.

It appears, though, that the real support factor for the IBM machine will be the software. Reportedly, IBM has already signed contracts with Micropro International Corp. to sell its series of word processing and data handling packages. Neither IBM nor Micropro could be reached for comment, but as this is being written, an announcement is expected within the month.

Even as IBM makes vigorous efforts to develop or buy software for the machine, other companies—such as New York City-based Lifeboat Associates, and tha Oakland, California firm, G&G Engineering—are already beating them to the punch. Lifeboat, for example, is readying a number of its popular packages including *TMoker*, an electronic spread sheet. According to Lifeboat's vice president of software development, Harris Landgarten, the company also has a product that will permit the use of any software written for Digital Research's CP/M-86 operating system to be used instead with the IBM's PC-DOS.

G&G Engineering's approach is different. Rather than providing products directly for the IBM machine, they are marketing tools that permit software designers to use other, more powerful systems, based on the popular S-100 bus, to create software for the PC. Furthermore, they have developed a software link—a reverse of Lifaboat's mentioned above—that permits any package written to run under PC-DOS to work with CP/M-86.

Software Lagging For The Model 16

Tandy officials, with surprising candor, are quick to admit the paucity of software for the 68000 microprocessor. They assert, however, that a single user operating system and the COBOL language will be available when volume delivery of the Model 16 begins. By the same time, Radio Shack plans to have converted for the machine a number of existing COBOL applications packages including accounts receivable and payable, general ledger, and payroll.

Unlike IBM, Tandy has elected to do its own development of the multi-user, multi-tasking operating system which the Model 16 needs to fulfill its potential. Many observers in the industry foresee a long upward path for Tandy before it has a viable system, and believe the company's choice is a mistake. Meanwhile, other companies do offer multi-tasking operating systems that might fill the breach. The MSP system, from Hemenway Corp., Boston, Massachusetts, supports multiple tasks and, according to chairman Jack Hemenway, can handle multiple users simply by adding the necessary software modules, a task Hemenway's firm is currently engaged in.

Users Don't Really Care

With all the hoopla surrounding both machines and all the learned prose from the so-called informed consultants, there is a fact escaping many who write about and analyze such microcomputer products—namely, most users don't really care whether or not the machine uses an Intel or Motorola part, or whether or not it crunches numbers as quickly as a multi-buck mini- or a mega-buck maxicomputer. There are, however, a few analysts who see the case from a user's standpoint.

Grant Bushee, a vice president of Cupertino, California-based Dataquest, hit the nail on the head when he described this latest round of high-performance micros as an emotional reaction rather than a solid technical decision. He believes it is hard to define what the right technical level is and that IBM forced the issue by using a 16-bit microprocessor when a standard 8-bit part would have served the purpose.

Bushee and other pundits agree that what is really required is for vendors to offer a large library of user-ware, rather than a raft of development-ware. Typically, users are asking for software items such as spreadsheet calculators, database managers, software interfaces that remove the operator from the operating system, the ability to handle several tasks concurrently, and packages in general that operate in an interactive manner.

While both the PC and the Model 16 are capable of running such software effectively, at bottom they are not really comparable machines. The PC is designed for single-user, single-task operations, or to work tied into a business' main computer. Moreover, the PC software philosophy appears to embrace the practice of using products that have already gained acceptance on other computers, such as Micropro's *WordStor*.

TRS-80 Model 16.

On the other hand, the TRS-80 Model 16 appears geared to multi-user, multi-task applications. Tandy's approach is more toward developing unique-to-its-machine software that meets demonstrated needs rather than the expectations of software designers.

Depending upon your specific application, either machine is adequate. This is a factor that is very important in today's system world, asserts Epson America's director of market planning, Chris Rutkowski. Referring to his firm's MX-80 dot matrix printer (supplied with the IBM PC), he comments, "This printer is adequate for the intended job. We never planned it to solve all printing problems, or to work with a big mini. What we developed is a printer that meets the expectations of small systems users. And that's exactly what's required of a microcomputer system." Rutkowski thinks it's foolhardy for system designers to try to be all things to all people. Moreover, he isn't convinced that current system suppliers really know what the intended users want or expect.

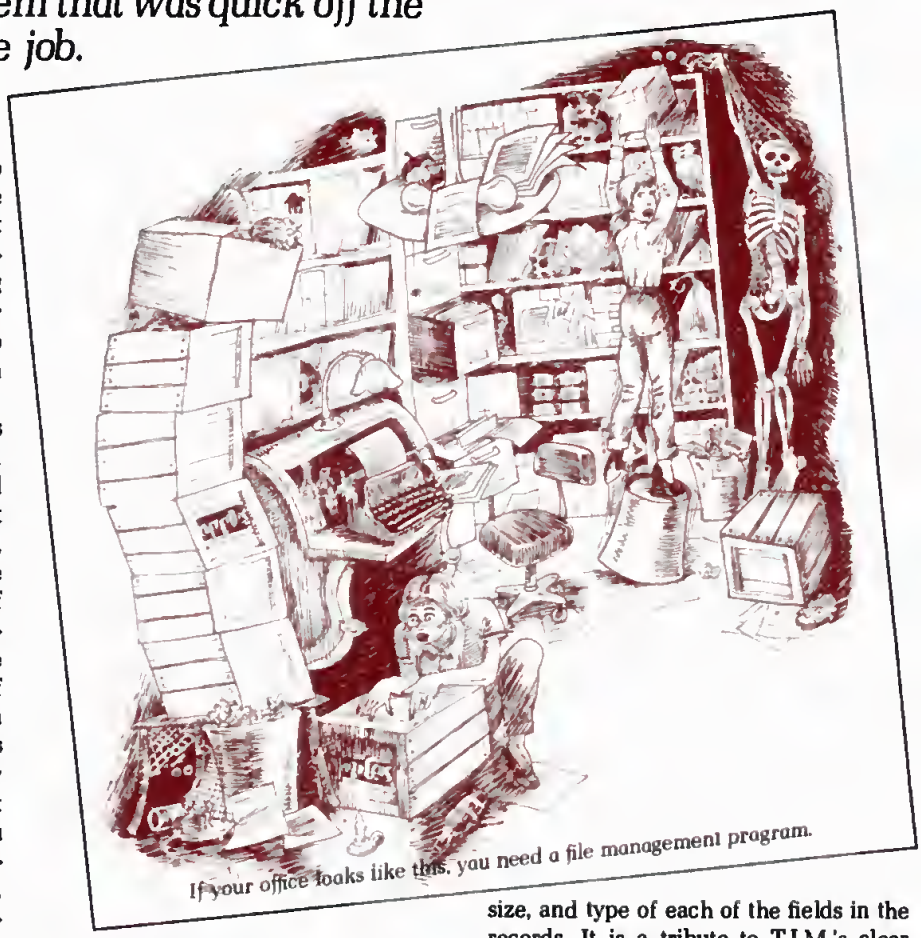
Rutkowski isn't alone in his opinions. Los Alamitos-based computer consultant Nancy McMullen has found that, more than anything else, users want a machine that works all the time every time and doesn't take a Ph.D. to learn how to use. In addition, she has found that users want some form of hand holding to get them used to the machine. And guess what? Tandy designers agree. They have found that users want as much help as they can get either from documentation or computer-aided instruction on how to use the machine. As a result, they are already offering such instruction with current machines and plan to extend the technique to the Model 16, as they release more software products.

The Barrels Are Smoking

As the two giants eye each other from opposite ends of Main Street, sunlight glints off the barrels of their six shooters. Each has fired a salvo but no wounds are yet evident. In the meantime, just beyond the horizon, another challenger is riding towards town . . .

Testing T.I.M.

A file management system that was quick off the mark, but slower on the job.



If your office looks like this, you need a file management program.

Tha gold rush is on. Everyone wants to develop and market software for the IBM PC, and many companies that hava been selling software on earlier personal computers are hurriedly converting their programs. T.I.M., which stands for Total Information Management, claims to be the first file management program available for the PC.

T.I.M. came out quickly because it is written in Microsoft BASIC and has been available for some time on other personal computers that, like the PC, use Microsoft BASIC. It is a file management system, which means that it can be used to create and maintain many different types of data files. It might be used with a personnel file, a fila of real estata listings, a file of subscribers to a publication or a file of books or phonograph records you own. In other words, a file management system is intended to help you keep track of any data you might be interested in; it is not restricted to a specific application. (If you are unfamiliar with the idea of a file management system and such terms as *file*, *record*, *field*, *keys* and index, see the introduction accompanying this article.)

First impressions

In looking at T.I.M. or any other package, I give myself one hour to read over the manual, and then try the program out. This enables me to form a first impression and to get a feel for how difficult it is to learn tha program. In that first hour I learned a T.I.M. file may contain as many as 32,767 records, if you have the disk capacity, and that each record can have as many as 40 fields which each may be up to 60 characters long. All of the records in a given file must fit into the same format. It is possible to create files, to maintain them, to look through them and to generate reports based upon the information stored in them. It seemed as if using T.I.M. would be easy because the manual is claarly written and well organized; however, the manual was disconcerting in one respect. It contains a number of references to earlier versions of T.I.M. for other computers, which seemed very careless and made me wonder if T.I.M.'s authors hadn't gone too fast in trying to be first on the market.

Having read the manual, it was time to try T.I.M. out. It comes on three disks, each of which contains different parts of the program. The fact that the program resides on three disks is bad news, since it means that the operator must often swap disks when a new function is needed. You also get a disk containing four sample data files that are used in the manual's tutorial examples. A beginner could learn nearly everything there is to know about T.I.M. by using these files in conjunction with careful study of these examples.

When T.I.M. is loaded, it displays a main menu which is used to move to other menus. The menus are nearly self-explanatory and "help screens" are only a keystroke away. I began by creating a file of chacking account data (described in the article *Files, Fields, Records, etc.*). This task involves specifying the name, size, and type of each of the fields in the records. It is a tribute to T.I.M.'s clear menus that doing so for tha check file took less than ten minutes and I only had to refer to the manual onca. I would expect that anyone with a little programming and data processing background would be able to do the same as easily. Defining a file in this manner creates a directory entry which contains the field specifications for future use, but doesn't enter any data into tha file. The next step was to add some records.

This proved to be as easy as creating the file had been. Once you select the "add record" command from the menu, the system displays a "form" on the screen, which shows each of the field names and their lengths. You can move the cursor to various parts of the form and key in values. There ara several time-saving data entry features; for instance, a single keystroke will insert the current date into a field, or duplicate the entry that was used in the previous record. When values are entered, the system

automatically does some error checking, e.g., it won't let you put letters in a numeric field; however, other desirable types of error checking, such as limits on numeric values, are not provided for.

Problems and Irritations

While I generally found the system easy to use during this first encounter, problems did turn up. In their hurry to be first on the market, the authors of the program went light on error checking. When I do something wrong, I want the computer to explain the problem and then give me a second chance. T.I.M. usually does just that, but all too often it just stops execution and returns to BASIC's command level. When this happens, you must take the time to restert the system end you mey heve lost work. Microsoft BASIC makes it possible for the programmer to intercept any error a user or the system may make, and this sort of blind return to the system should never occur. Another irritation is that, in an attempt to save the operator a few keystrokes, T.I.M. does not wait for you to hit the "enter" key after you type something which it knows will only be one character long, for example, a menu selection. This sounds good, but what happens in prectice is thet you often hit the enter key anyhow, which generally signals some further action choice. This is good intention, but bad design, especially with untrained operators.

Speaking of untrained operators, I showed one how to use T.I.M., and within an hour, she was able to add records, search for records and update (alter) records in the check file. While the two problems mentioned in the previous paragraph bothered her, this still seemed a reasonable learning time.

Overall, the first impression is that T.I.M. is easy to learn and to use. Part of that simplicity is achieved by cutting down on options which you might like to have, but much is due to good design and documentation. On the other hend, careless re-writing of an earlier manual and failing to account for many operator errors evidences a blind rush to get the product on the market. Finally, compared to file management systems on other personal computers, T.I.M. seemed slow because it is written in Microsoft BASIC.

Further Exploration

Several experiments were tried in order to get some data on T.I.M.'s speed and storage requirements. The results are summarized in Tables 1 and 2. Files containing 12, 100, and 500 records were generated using a test program. The records in these files contained a four digit numeric field in addition to the fields of the check accounting file. This extra field, which contained a random number from 0 to 9999, was used for time sorting and record retrieval. Each of these files was the only one on its disk. Two drives were used in all of the tests, one for the program and the other for the data file. In tests involving two data files, such as copying the records from one file to another for backup, each file was on a different drive in order to speed things up as much as possible. Although it didn't seem to make much difference, the maximum T.I.M. buffer size of 2,400 characters (bytes) was used for each test. Times shown in Table 1 don't include time spent in swapping disks and setting up the various operations. For example, the time for sorting a key does not include choosing the sort option from the menus or specifying the sort keys; it is just the time for the actual sorting.

Vital Statistics:

Program Name: T.I.M.

Compeny: Innovative Software
9300 West 110th Street
Overland Park, KS
66210
(913) 888-0154

Price: $500.00

Herdware Requirements:
64K memory
80 column display*
1 disk drive
80 column printer*

Language:
Microsoft BASIC

Operating System: PC DOS

Program Capacities:
32,767 records per file
40 fields per record
60 characters per field
40 index fields per file

Command Structure: menus

User Aids: help screens
function key legends

*Initial version works only with monochrome display and parallel printer adapters.

The times necessary to create the test files are shown in the first line of Table 1. Once the files were created, I mede a minor change in their definition. This restructuring is done by creeting a second file and then copying the data from the first file into it. Creating the second file, with a change in field size and type, took only a few minutes and went smoothly. Once the new file was created, the old deta was copied into it. The copy time for the 12 record file was only 57 seconds, but, es you see in Table 1, restructuring the larger files took much longer.

In addition to restructuring date files, it is possible to change the appearance of the screen forms. Again, only a few minutes were required to design the custom form shown in Figure 3.

I was also curious as to how much disk space a file would occupy. Each T.I.M. file requires a data file on the disk, a directory entry and a file for eech key which you define. Table 2 shows the disk requirements for my 12, 100 and 500 record files. The data and index files grow in proportion to the number of records added, but the directory entry does not. The designers of T.I.M. could have made some tradeoffs at this point, for example, encoding the data file or using variable length fields; however, this would have slowed the system down, a price that they were evidently not willing to pay.

File Maintenance and Locating Records

Once a file is created, most of your time will be spent in maintaining it, which means adding records, deleting

Files, Fields, Records, etc.—An Introduction

Before getting into a review of T.I.M., we should agree on a few basic terms and concepts having to do with data files. Let's start with the words *file* and *record*. For the time being, forget that we are speaking about computers and ask yourself what these words mean. For example, if you call your auto insurance agent and he says, "Just a minute while I get your record from my file," what is he saying? He probably goes over to a metal filing cabinet where he has the records for all of his customers and takes out a single folder with your record in it. Inside the folder is a form which has all sorts of information like your name, your address, the make and model of your car and how much liability insurance you carry. He is looking at your record, but, if he looked at my folder, he would find the same form filled in with my values. He will refer to the items on the form as *fields*.

The ideas of file, record and field also apply to computer data files. In the same way that the insurance file was made up of many records, a computer file is made up of many records. Let's also assume that each record contains the same categories of information (fields) arranged in the same order, just as each person's insurance record used the same form. As a simple example, consider a file with information on your bank checking account, having one record for each check you write. What information would you like to store on your checks; in other words, what would be the fields in tha check records? The check number, date, name of the recipient, amount of the check come immediately to mind. You might also like to store a remark to remind you of the purpose of the check, and a code to separate the business checks from the personal ones.

Figure 1 lists the names of these fields along with their sizes and the type of information which can be stored in each. For example, the amount field is 10 characters wide and can hold a dollar figure, while the business/personal code field is only one character wide. The remark field is fifty characters wide and the type, alphanumeric, means that any alphabetic, numeric or special punctuation character is okay. Field names, sizes and types are some of the information which must be provided to a file management system whenever a new file is created.

Field name	Length	Type
Check number	5	sequential number
Date	8	date
Recipient	25	alphanumeric
Amount	10	dollar
Bus/pers	1	alphanumeric
Remarks	50	alphanumeric

Figure 1. The name, length and type of each of the fields in a check file.

CHECK NUMBER	DATE	RECIPIENT	AMOUNT	BUS / PERS	REMARKS
1	02/12/82	John Press	25.00	P	for books
2	02/12/82	John Press	125.00	P	delivery work
3	02/12/82	Samantha Press	12.50	P	candy
4	01/21/82	Roberto Lastrico	400.00	B	clerical work
5	12/21/81	Roberto Lastrico	325.50	B	typing
6	01/21/82	Joe Press	50.00	P	birthday present
7	01/19/81	Natalia Lastrico	37.45	P	party supplies
8	02/12/82	Carla Lastrico	550.00	B	data management software
9	02/12/82	Carla Lastrico	1250.00	B	printer and adapter
10	02/12/82	Lillian Press	125.00	B	turkey
11	02/12/82	Marcela Ortuzar	417.00	B	auto repair
12	02/12/82	Marcela Ortuzar	31.50	B	spark plugs and hoses

Figure 2. A 12 record check file.

A: 3, 1, 12, 7, 6, 2, 10, 5, 4, 11, 8, 9
B: 8, 9, 7, 4, 5, 6, 1, 2, 10, 3, 11, 12
C: 12, 10, 5, 4, 11, 8, 9, 3, 1, 7, 6, 2

Figure 3. Three indices for the file shown in figure 2. The first index (A) orders the file on check amount. The record with the smallest amount ($12.50) is first, etc. The second index alphabetizes the file on recipient's name (last name first). The third index sorts the file on two fields, one within the other. Can you see which ones?

Figure 2 completes this example by listing 12 records which might be found in our check file. Take a look at it to make sure that you understand the ideas of file, record and field, because we will use this data in several tests of T.I.M.'s performance.

We also need to say something about key fields and indices. Glance back at Figure 2. What order are the records in? What order would you like them to be in? At one time you might be interested in searching for or printing out the checks written to a certain person. In that case, it would be nice if they were sorted alphabetically by recipient's name. If, however, you wanted to find the check you wrote on a certain day, you would like them sorted according to date. It is clear that there is no single answer to this question. Can you give a few other examples where still different ordering would be preferred? I have been speaking of "sorting" the records and, while computers can certainly be programmed to physically reorder the records in a file, there is another, often better, way to deal with the need to retrieve records in varying order. This involves building key fields and building indices.

Figure 3 illustrates these ideas. Let's say, for example, that we wished to be able to retrieve records in order by the amount of the check. We would say that AMOUNT was a key field and build an index. The index could be merely a list of record numbers, in order of ascending check amount. Figure 3 illustrates these ideas, but, in order to understand it, you will need to refer back to Figure 2, which lists the

tire data file. The first index shown ere sorts the records by check nount. Record number 3 is for the allest amount ($12.50), record num- r 1 is for the next smallest ($25.00). . The largest check ($1,250.00) is cord number 9, so it is the last entry the index. Figure 3 also shows an dex on the RECIPIENT field, which orts" the file into alphabetical order. ie third index shown in Figure 3 is a tle bit trickier. Can you figure out nat it does before reading on?

The third index uses multiple keys sort the file on AMOUNT within JS/PER. What this means is that all the business checks will be sorted to one group and all of the personal ecks into a second and that within ese two groups, the records will be dered by AMOUNT. Note that in gure 3 the business checks all pre- de the personal checks. Why didn't e personal checks precede the busi- ess checks? Because the code for isiness, "B", precedes the code for ersonal, "P", in the alphabet. In this ample, we would refer to BUS/PER the major field and AMOUNT as e minor field. Note that there is othing to stop us from building a key hich orders the file on more that two elds, for instance, it might be useful report your checks by AMOUNT ithin RECIPIENT within BUS/PER. an you think of other keys which ight be useful.?

Finally, you may have heard of utobose or doto management systems. ud be wondering if they are the same file management systems such as I.M. While there are no universally cepted definitions of these terms, I ould distinguish a file manager as eing more limited than the others. A e manager, as I use the term, is de- gned to work on one file at a time ther than an entire database which ight be made up of many files, all of hich are related to each other. Al- ough T.I.M. is able to generate a cer- in type of report using two files, it is ot designed to handle multi-file data ases; each T.I.M. file is treated inde- endently.

—Larry Press

them and changing or updating them. Adding records is quite simple, as stated above. A form is displayed on the screen and you "fill it in." Filling in and editing this screen form is accomplished using the commands shown in Figure 4. The function keys on the left of the keyboard are used instead of the cursor control, insert and delete keys on the right. This is a little confusing; however, it enables you to use the cursor control keys as a numeric keypad. After you add new records, they must be merged into the data file, and, again, you notice how slow T.I.M. is. Table 1 shows the times needed to merge just a single record into a data file.

To delete or update a record, you must first locate it in the file. Figure 5 shows the interactive commands which may be used in finding records in a T.I.M. file. For instance, if you wanted to find a check that you had written to Roberto Lastrico, you would like to step through the file using the RECIPIENT field as a key. T.I.M. will let you do this, assuming that an index has been created for the key field. T.I.M. is quite flexible in the creation of indices. A file may have up to 40 indices and they can be based upon either simple, single field keys or compound, multiple field keys. For instance, an index might sort the file on AMOUNT within RECIPIENT. This flexibility is quite useful and, like everything else in T.I.M., creating an index is easy but time consuming.

To create an index all you do is specify the key fields, start the sort and get a cup of coffee. Table 1 shows the time to sort the check file on the four digit random number field which was added for this test. The 12 record file required only 19 seconds; however, sort times grew rapidly with file size and 100 records took a minute and 59 seconds. I tried the 100 record sort again using the check number field, which was already in sequenca rather than random, but that saved only 6 seconds. The fun really began when I tried a 500 record file. Not only did the time escalate to 22 minutes, but the sort did not work properly!

Once a key is built, it is possible to step through the records as if they were in order by that key, but it takes about 3.2 seconds per step. If we are looking for Roberto Lastrico's check, we don't want to search alphabetically, we want to jump straight to it. Direct (non-sequential) searches can take only one form in T.I.M.: the value you are searching for must exactly match the contents of the key field. In our example the search would be for a record in which the RECIPIENT field contains "Roberto Lastrico." The time to search for a record varies depending upon where it happens to fall in the index, so Table 1 shows a range of times for searchas in files of 12, 100, and 500 records. It might not seem like 10 or 15 seconds is long to wait for a search, but I have used file managers on other personal computers that were much faster, requiring more like 2-3 seconds. Because it is written to run under PC BASIC, T.I.M. is slow. Furthermore, few systems would limit you to searches for exact matches on single fields.

Sinca it is good practica to back up your files periodically, another test measured the time necessary to copy a data file—including its directory and indices—from one disk to another. Table 1 shows the times needed for each file. (Since a T.I.M. data file can have several associated files, like the T.I.M. directory, which must be kept together with it, you must use the copying functions built into T.I.M., rather than DOS, for duplicating T.I.M. files.)

Generating Reports

In addition to looking through data files and maintaining them, a file management system allows you to generate reports about the data in a file. As a report generator, T.I.M. is easy to use, but not very flexible.

Let's say that we want a report which shows the check number, date, recipient's name, amount and indication as to business/personal for each of the checks in our 12 record file. The first step is to define the report format, which takes only a minute or so. It is also easy to try your report out by having it "print" on the screen rather than on paper, and if it is not quite right, it is very simple to edit it. Once the format dafinition is complete, it can be saved in a library and reused without repeating the definition process.

Figure 6 shows a copy of this report. Part of the reason that defining the format of the report was so easy is that T.I.M. does not give the user much flexibility. For example, it would be nice to use report headings which were not the same as the field names you chose when creating the file, to have two-line headings, to center, left justify or right justify a column of data or to space the columns out. Had

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T.I.M. provided such options, it would have been possible to produce a report like the one shown in Figure 7. It would have been nice if report definition had been handled in the same manner as screen definition, where the user is allowed to create a special custom design if the pre-designed formats don't satisfy.

T.I.M. wouldn't be the T.I.M. we've grown to know if printing reports weren't a bit slow as well. The report shown in Figure 6 required 45 seconds print time and the one in Figure 6 took 68 seconds. Admittedly, the IBM matrix printer is slow, but even it had to wait for T.I.M. to prepare lines for printing.

Reports can also have control breaks. For example, it is easy to generate a report such as Figure 8, in which business and personal checks are listed separately and subtotals are calculated for each group as well as a grand total. Defining that report took less than a minute, but again, additional features such as more levels of subtotals (T.I.M. allows two) or calculation of averages could have been provided. Finally, although not shown in our check example, it is possible to have fields (report columns) which are calculated from other fields. For instance, in an inventory report, quantity on hand could be multiplied by unit price to create an inventory value field.

What if you wanted a report that showed only checks greater than a given amount, or only business checks? It would be nice if it were possible to directly specify such a sub-file, but it is not. Instead, it is necessary to first create a second file which contains only the records that you wish to include. Then you print the report using that smaller file. This is conceptually simple, and defining the selection criteria for creating the sub-file is, as usual, very easy; however, the process is inefficient since T.I.M. must read through the entire file in selecting the sub-file and then read through the entire sub-file to print the report. As we have already seen, T.I.M. does not posess blazing speed, so going back through the data file takes a lot of time. Table 1 shows the time necessary to select the business checks from our files (about half, selected at random, were business checks).

Conclusion

A general picture begins to emerge from all of this. On the positive side, T.I.M. is easy to use. The manual is well

Timing T.I.M.

Operation	Number of Records in File 12	100	500
Convert ASCII file to T.I.M. format	45s	5m 51s	29m 9s
Restructure file	57s	7m 3s	37m 33s
Merge single record into file	57s	1m 51s	4m 34s
Sort (create index) on 4 digit field	19s	1m 59s	22m
Search on 4 digit random number key field	7-9s	10-15s	15-19s
Copy file, indices and directory	57s	2m 10s	7m
Select subfile for business checks only	54s	3m 49s	17m 55s

Table 1, Tests of T.I.M. speed. Three check files, with 12, 100 and 500 records were created. A special 4 digit, numeric field containing a random number was added to each record for the purpose of timing sorts and searches. Times are shown in minutes and seconds.

File	Number of Records in File 12	100	500
Directory	1664	1920	1920
Data area	1280	10498	52224
Indices (per field)	512	512	1280

Table 2, Disk space requirements. Each T.I.M. file requires disk space for a directory entry, the data records and the index entries.

```
Main T.I M. Menu

   A = Add/Inspect/Update a record          L = List generetion
   C = Creete e new file                    M = file Maintenance
   D = Disply T.I M. directory              R = Report generetion
   F = File specifications                  S = Select records from a file
   H = Help menu                            U = Utility commands
   I = word processor Interface             X = eXit to opereting system

Enter command
```

Figure 1, The main menu. This menu is used to access secondary menus. It is often necessary to change program disks when moving from one menu to the next.

```
FILE  B CHECKS   EOF   KEY: SEQ   DIR  +    SCREEN: 1
RECORD  14 ( 14 )      DEL N       TYPE S D

1 Check Number _____
2 Date _______
3 Recipient ________________________
4 Amount __________
5 Remarks ____________________________________________________
6 Bus/Pers _

1=Lft 2=rt 3=Up 4=Dwn 5=Insert 6=C dlt 7=Last 8=Date 9=F dlt 10=Exit
```

```
FILE  B CHECKS   EOF   KEY: SEQ   DIR  +    SCREEN: 1
RECORD  14 ( 14 )      DEL N       TYPE S D

1 Check Number _____ 2  Date ________ 4 Amount __________

3 Recipient ________________________ 6 Bus/Pers _

5 Remarks ____________________________________________________
```

Figures 2 and 3, "Default" screen layout for check file, with fields displayed one per line, and custom screen which can be designed with a little extra work

```
cursor movement by character          jump to the first record in sequence
cursor movement by field              jump to record n in sequence
cursor to top of form                 step +/- 1 record in sequence
character insert                      jump +/- n records in sequence
cheracter delete                      seerch sequentielly for match on partial field
field delete                          step +/- 1 record using key field
teb                                   jump +/- n records using key field
insert current dete                   seerch for exact match using key field
use value from prior record
```

Figures 4 and 5, T.I.M.'s commands for editing and locating records.

Sequential Check Report
02/21/82

Check Number	Date	Recipient	Amount	Bus/Pers
1	02/12/82	John Press	25 00	p
2	02/12/82	John Press	125 00	p
3	02/12/82	Samantha Press	12.50	p
4	01/21/82	Roberto Lastrico	400.00	b
5	12/21/81	Roberto Lastrico	325 50	b
6	01/21/82	Joe Press	50 00	p
7	01/19/81	Natalia Lastrico	37.45	p
8	02/12/82	Carla Lastrico	550 00	b
9	02/12/82	Carla Lastrico	1250 00	b
10	02/12/82	Lillian Press	125 00	b
11	02/12/82	Marcela Ortuzar	417.00	b
12	02/12/82	Marcela Ortuzar	31.50	b
			==========	
<GNO-TOTAL>			$3.348 95	

GR Record count = 12

Figure 6, Report. Showing check number, date, recipient name, amount and the business/personal code

Check Number	Date	Recipient's Name	Amount	Bus (b) Per (p)
1	02/12/82	John Press	25 00	p
2	02/12/82	John Press	125.00	p
3	02/12/82	Samantha Press	12.50	p
4	01/21/82	Roberto Lastrico	400 00	b
5	12/21/81	Roberto Lastrico	325 50	b
6	01/21/82	Joe Press	50 00	p
7	01/19/81	Natalia Lastrico	37.45	p
8	02/12/82	Carla Lastrico	550.00	b
9	02/12/82	Carla Lastrico	1250.00	b
10	02/12/82	Lillian Press	125 00	b
11	02/12/82	Marcela Ortuzar	417.00	b
12	02/12/82	Marcela Ortuzar	31.50	b

Figure 7, Improved report. The formatting of the report shown in figure 6 left something to be desired. This illustration shows some ways in which it could be improved: centering columns, spacing them out, two-line headings, etc. Unfortunately, these are not possible using T.I.M.

Business and Personal Checks
02/21/82

Bus/Pers	Date	Recipient	Amount	Check Number
B	02/12/82	Marcela Ortuzar	31.50	12
B	02/12/82	Lillian Press	125 00	10
B	12/21/81	Roberto Lastrico	325.50	5
B	01/21/82	Roberto Lastrico	400 00	4
B	02/12/82	Marcela Ortuzar	417 00	11
B	02/12/82	Carla Lastrico	550 00	8
B	02/12/82	Carla Lastrico	1250.00	9
<TOTAL>			$3,099 00	
MJ Record count = 7				
P	02/12/82	Samantha Press	12.50	3
P	02/12/82	John Press	25.00	1
P	01/19/81	Natalia Lastrico	37 45	7
P	01/21/82	Joe Press	50 00	6
P	02/12/82	John Press	125 00	2
<TOTAL>			$249 95	
MJ Record count = 5				
<GNO-TOT			$3,348 95	
GR Record count = 12				

Figure 8, Totals and subtotals. Subtotals are printed whenever the value of the control field (bus/pers) changes. Before the report was printed, an index sorting the file on amount within bus/pers had to be created.

organized and clearly written. The screen interaction, menus and help screens are done well enough that it is seldom necessary to refer back to the manual after a first reading. Anyone who is familiar with data processing and has some background in programming should be able to set up T.I.M. files and reports. Once a file is defined, a few hours would probably suffice to train a non-technical person to operate the system well enough to maintain files and generate reports.

To some extent, T.I.M. is easy to use because it is simple and doesn't offer many options to the user. There could have been more flexibility in searching for records and in report definition, for instance. However, a good part of the ease of use must be attributed to the design of the system, so, if T.I.M. is capable of doing your job, you will find it friendly to use.

Unfortunately, you will also find it slow. Because of this, T.I.M. is best suited to applications where files are small, unless it is possible to process information in relatively large, periodic batches (such as a mailing list for a monthly publication). T.I.M. would be poorly suited to tasks such as an inventory system, where the file ought to be updated whenever a transaction occurred.

A good deal of the blame for this slow operation (and probably for the decisions to cut down on options) is due to the fact that it runs using the Microsoft BASIC interpreter. When Microsoft makes their BASIC compiler available for the PC, a considerably faster version of T.I.M. should be forthcoming. Speed of operation would also be enhanced by using a hard disk rather than floppy disks. Not only would speed of reading and writing the disk be increased, it would no longer be necessary for the operator to swap the three program disks in and out of the floppy disk drive. That gets tiresome in a hurry.

But all of T.I.M.'s shortcomings cannot be blamed on the BASIC interpreter. I also think that its release was too rushed. This shows up in many ways, like the careless editing of the manual for the PC version, several minor bugs in the program, a few major bugs in the program and not trapping all operator errors. I am sure that all of these problems will eventually be cleared up, but an extra month or so of testing and fixing should have prevented them.

USER'S REPORT/CHERYL WOODARD

T.I.M. Faces Real Life

As Marketing and Sales Director of *PC* magazine, *I* have many of tha business needs that a database management program such as *T.I.M.* is designed to satisfy. *I* keep records on advartisers, potentiai advertisers, and retail distributors that number in the thousands, and must monitor magazine shipments to dealers and advertising orders, as well as their related invoices.

Looking through the *T.I.M.* manual, *I* discovered many ways *T.I.M.* could halp me organize the mass of information my department routinely handles. I've used other off-the-shalf microcomputer programs, so the terminology—"files," "record lengths," "bytes,", atc.—did not intimidate ma. In fact, the manual gava me bright hopes that *T.I.M.* and *I* would gat along quite well; *I* felt, after reading the manual from cover to cover, that I had a sound understanding of *T.I.M.*'s capabilities, limitations, and mode of operations.

Knowing I had a review to write and only a limited amount of time in which to writa it, I decided to limit my work with *T.I.M.* to the Retail Dealer Sales functions. I tentatively planned to use *T.I.M.* files and reports in the following ways:

1. To generate mailing labels;
2. To generate sales reports and inventory, open inventory, and dealer lists by using a file based on invoices and a file based on dealers;
3. To use the dealer file to ganarate lists of buyers and their telephone numbers; and
4. To use a word processing program, together with the dealer fila, to generate 'personalized' form letters.

My first hands-on ancounter with *T.I.M.* was painless. Within hours, using the program was almost effortless; within two days, we had created, modified, and restructured a dealar file containing 94 names. At this point, *I* wrote a letter to a *I*riand, saying, "TIM is great! It's going to make things a lot easier for ma."

And then the problems started.

When *I* encountered error messages I didn't understand, I called Innovative Software for help; fortunately, I knew enough about computers to know that we should copy the error messages exactly as they appeared on the screen, even though they were completely meaningless to us. The people at Innovative Software patiently listened as *I* recreated the situation and read them the error messages. Shortly thereafter, they called back to explain that I had a "bad disk" and that they'd rush a new copy to me overnight. They did, and my work was interrupted only for a day or so; but the situation was still upsetting.

Woodard: "My overoll impression of T.I.M. wos more positive thon not . . ."

First, the absence of any explanation for tha error messages in the manual le*I*t us unable to solva the problem without assistance; this omission continues to plague me. Further, the programs revert to BASIC whenever anything goes wrong, and the documentation offers no assistance in recovering from the error.

A second problem had nothing to do with *T.I.M.* but everything to do with using a computer in an office situation. When the new copy of *T.I.M.* arrived, an over-zealous co-worker re*I*ormatted and recopied the program disks; in the process, he erased everything we had done to that point. It took at least a day to recreate the lost files; as a result, I learned to keep our working files on diskettes locked in my desk.

At this point, *I* had to revise the scope o*I* my review, sinca time was running out and I discovered that some of tha program options were unavailable. For example, when the word processing option is selected from the main menu, it reads, "not available." Also, the reporting format proved to be so awkward for generating invoices that *I* decided to have them printed and to complete them with a typewriter.

*I*n light of my revised expectations, *I* proceeded to have dealer files, reports, and lists developed. All of these files, lists, and reports have proven to be helpful, and thus my overall impression of *T.I.M.* is more positive than not. It's a ralatively 'friendly' program that is both easy to learn and flexible to use, and I'm impressed by the variety of ways in which it can report in*I*ormation *I*rom the dealer files.

On the other hand, we encounterad some aspects of the program that were so frustrating they caused us to limit the number o*I* applications in which we could utilize *T.I.M.* A *I*riend o*I* mine, who is a programmer, tells me that many of these problems do not originate with the *T.I.M.* program itself. In the following examples, when I know *T.I.M.* to be blameless, I'll say so.

First, *T.I.M.* comes on three program diskettes which are used in conjunction with a data diskette containing your files. To move through the various phases of a particular operation (e.g., updating a file, sorting it in some particular sequence, and writing a report), we had to shuffle the three program disks in and out of the disk drive; it seemed that 90 percent of our time was spent waiting in front of a screen that read, "One moment while program is loading."

My friend told me that this problem was the result of IBM's diskette format, which doesn't provide adequate space for large programs. Since there's 256K of memory on my IBM PC, *I* asked him why the program hadn't been designed to allow all the programs to be loaded into memory at one time. The answer: *T.I.M.* is written in Microsoft BASIC, which, although easy to use, is unable to address more than 64K of memory at one time. Therefore, this frustrating and time-consuming feature of *T.I.M.* represents a trade-off in which ease of language use was achieved at the cost of program efficiency. Perhaps a brilliant and user-dedicated programmer could have overcome these limitations and/or reached a more satisfactory compromise, but the *T.I.M.* programmers have chosen not to do so. Perhaps this problem will be solved in future versions.

Although *I*'ve already mentioned the omission of error messages from the manual, I want to come back to that topic because it was another source of recurring frustration. The following incident is typical:

I was trying to save a report format in the Report Format Library and was repeatedly tossed out into BASIC. Receiving no explanation from either the computer or the manual, I had to spend 45 minutes trying to discover why a program that worked yesterday was not working today. Finally, using the IBM DOS command, "Check Disk," I discovered that the diskette was full and, therefore, would not accept any more data.

In this case, discovering the nature of the problem did not solve it, or even suggest a solution, since it is a feature of the program's design to store libraries on an already crowded program diskette, not on the data diskette. The only way to overcome this particular obstacle is to make several copies of the program diskette and to distribute the different libraries among them. It took an entire afternoon to solve this problem; better documentation would have made that effort unnecessary.

My final criticism concerns sorting speed. When the dealer file contained only 94 records, it could be sorted very quickly; now that it contains more than 250 records, a sort takes a great deal longer. The *T.I.M.* manual warns that having several key fields would slow the sorting and merging processes, and so we've reduced the key fields to the two that are essential: zip code and standing order. As our *PC* dealer base grows—and it has the potential to reach 2,000 by the end of the year—all of these processes will become even slower.

As a result of this problem, I have decided not to use *T.I.M.* in applications requiring frequent sorting of large(r) data files. For example, *I* plan to have a file created which would describe all of our present and potential advertisers in some detail. There are already more than 700 such companies and individuals on our "comp list" and the number is growing rapidly. I don't think it would be wise to use *T.I.M.* with a list that size.

There are other minor problems that will undoubtedly be corrected before long, e.g., *T.I.M.* can't be used with a color monitor and the word processing interface isn't yet available. All in all, *T.I.M.* is better than a filing cabinet and we will continue to use it for small, uncomplicated tasks such as mailing lists since it's easy to learn and flexible to use. However, *I* do hope that a more powerful database program—one that's able to perform the more sophisticated tasks *I* have in mind—will be available soon.

Clifford Barney

THE VIRTUAL MEETING

Using your computer for online conferencing

Computer conferencing is not a substitute for anything, but is an entirely new form of group interaction. The members do not meet, and it is irrelevant whether or not they are "online" at the same time. They communicate with each other indirectly via the computer files which they jointly create and which they access via software on a "host" computer system. The host, which may be any suitably equipped and programmed computer but is usually of the large, traditional type, keeps track of who has seen what entries in the file and notifies users when new material is present.

The only equipment required for computer conferencing (CC) is an ordinary terminal with communications capability—hardly a rare item today. Personal computers such as IBM's PC can easily be set up to fill the role.

The mechanism of CC is simple. The host computer recognizes individual users, or "accounts," as members of a given conference. The members are permitted to read and write in its files according to whatever protocol they want to establish. In an open conference, users can read all of the items and enter their own contributions. Normally, they will not be able to change files created by others; however, in some instances, it may be useful to give one member the editorial power to add and delete. Files may be either signed, unsigned, or even pseudonymous. Members may send messages to each other privately and may have a personal file space for notekeeping.

When this system is linked with a personal computer that has its own information processing capability, the user has an unprecedented opportunity to integrate his/her individual work with others'. Cooperation takes on a new dimension when the individual is free to work at an individual pace, yet the network is always available.

How this capability is put to use depends upon the purpose of the conference. The files may contain little more than items of general interest to a loose group of colleagues, or they may record something as detailed as the creation of a precise electrical specification.

"Only the help pounds a keyboard . . . voice input/ output is the opium of the managerial class."

One of my favorite examples of the application of computer conferencing is the inside-out press conference conducted on EIES. Art Kleiner, an editor of Co-Evolution Quorterly, set up an on-line meeting for the sole purpose of providing him with the information he needed to write a magazine article. As a reporter who is used to chasing news sources—or ducking them when they thought they'd been misquoted—I was enchanted by the simplicity of Kleiner's vision. He had collected all of his sources in one electronic space and had their comments in a machine-readable form. There had been nothing like it in the annals of journalism since the days when Welsh bards from opposing armies met on a hilltop during a battle to decide among themselves how the fighting should be reported.

Despite its advantages, CC is widely held to be unsuitable for commerce because it requires the use of a terminal. "Only the help pounds a keyboard" is the way this view was expressed in one EIES conference. The emerging class of personal computer owners together with the generation of kids now surfacing in Komputer Kamp and in video game arcades may undermine this premise.

A subtler objection to CC is that it demands written input. Few people like to write, whereas many people enjoy the sound of their own voices, so sweetly reasonable and so soon forgotten. Voice input/output (I/O) is, in fact, the opium of the managerial class. Freed of the demands of typing, the theory goes, executives will treat their computers like robot secretaries: take a letter, file this, what's next on the schedule?

Unless managerial speech has suddenly acquired a clarity unknown elsewhere in society, however, the resulting text is likely to be unreadable. Though humans are frequently capable of flights of eloquence, very few of us speak in ordered sentences and paragraphs. Speech is by nature redundant and elliptic; written text is, or strives to be, ordered and complete. Someone will have to edit the spoken input.

In any case, the issue is probably a chimera. A study of EIES use by sociologist Roxanne Hiltz showed that the prime determinant of system use was neither typing ability, nor familiarity with computers, nor preference for speech over written communications—these factors proved to be of no measurable influence—but *mindset*. The people who used the system most and professed to get the most out of it were the ones who onticipoted that they would like using EIES before they ever came on-line. They proved to be the people who already knew other on-line participants; in other words, the ones who already had some community of interest.

Hiltz's results illuminate the true nature of computer conferencing: It is a system by which people with a joint purpose may conveniently carry it out. Surely someone can find a use for that.

Conferencing Networks: What's Available

One of the reasons that CC is so mysterious is that it is not yet widely available. The largest conferencing system, the ARPANET, with more than five thousand members, is restricted to Defense Department contractors. (Although outsiders may slip in through a few semi-legal 'gateways', they do not normally have access to the full system.)

The Electronic Information Exchange System (EIES) provides very sophisticated conferencing software and is accessible via Telenet. Members pay $75 per month plus $7.50 per hour for Telenet's packet-switching services. Query Anita Graziano at the Computerized Conferencing Communications Center, 323 High Street, Newark, NJ 07102.

Some so-called "community bulletin boards" offer conferencing software for local use; a prime example is the Conference Tree, which began in San Francisco and is presently cloning in other cities. A directory of community bulletin boards is available for $1 from AMRAD, 524 Springvale Ave., McLean, VA 22101.

Cross Communications Co., of 93 Pearl St., Boulder, CO 80303 is offering a entire conferencing package, called "Matrix," for installation on DEC computers Cross also plans to make Matrix availabl via Telenet for approximately $20 pe hour.

The Rolls-Royce of conferencing systems is probably Augment, a corporat product from Tymshare, 20705 Valle Green Drive, Cupertino, CA 95014. Aug ment provides ARPANET-like service either in-house or via Tymnet, Tym share's packet network.

A rudimentary conferencing syster may be constructed out of the messagin and bulletin board services provided b Telemail, which is itself a value-adde service of GTE Telenet. Telemail charge corporate users $140 per month, with $500 minimum on Telenet charges.

The Source, an information networ owned by the Reoder's Digest, will offe a form for conferencing via its Participat service this spring. Participate was devel oped on EIES and is migrating to th Source in several forms and at severa price structures. Basic Source rates are $100 entry fee plus from $4.25 to $17 pe hour of connect time (depending on th time of day). Source headquarters is lo cated at 1616 Anderson Road, McLear VA 22102; accounts are also sold at Com puterLand stores.

"Computer conferencing is a system by which people with a joint purpose may carry it out."

For those who would like to read mor about CC, the canonical text is The Ne *work Notion*, subtitled "Human Commu nication via Computer," by Starr Rox anne Hiltz and Murray Turoff of EIE (Addison-Wesley, Reading, MA, 1978 This book is a technical, historical, an sociological description of CC. A nev summary and analysis of research int CC is to be found in *Studies of Compute Medioted Communicotions System Stotus ond Evoluotion* by Hiltz and EIE colleague Elaine Kerr. It will be pub lished this spring by the Academic Pres New York.

Face-to-Face vs. Computer vs. Video

Conferencing Compared:

Computer conferencing is such a mysterious animal that there is a great temptation to begin by describing what it isn't. It isn't electronic mail, for instance. And it isn't back-and-forth on-line messaging, like a written-out telephone call. And it certainly isn't video conferencing.

However this procedure may be dangerous. The "not" operator functions in some sentences in such a way that the reader or listener gets the uncomfortable feeling that the existence of something is asserted in one breath, only to be denied in the next, as we may see in the well known self-canceling instruction, "Don't think of a hippopotamus."

There was a professor of anatomy at Cambridge University who was apparently ignorant of this semantic pitfall, for in his lectures, he always listed the common mistakes that students inevitably (in his experience, anyway) made. "The nerve doesn't go here," he would say, "and it doesn't go there, and so you don't get this reflex and you don't get that one." Not surprisingly, he often had cause to lament, "I told my students exactly the mistakes they should avoid, and these are the very mistakes they always make."

It is probably best, therefore, to describe computer conferencing by stating what it is, rather than what it isn't. Yet here again we meet that subtle serpent, the negative; the most obvious fact about computer conferencing, and the one that separates it from all other forms of teleconferencing, is that it is osynchronous, i.e. the members need not be present simultaneously. Expressed more positively, it is a meeting or conference between dozens or even hundreds of people, that takes place when only one of them is present. That person is the one who happens to have the attention of the host computer's operating system.

In this respect, computer conferencing (CC) resembles a formal conference in which one must first obtain recognition from the chair in order to speak. However in CC one does not speak, one writes; and that is its second defining characteristic. The creation of a continuous written record is CC's most original contribution to group communication. Here is a medium that makes it possible for a large group of people, widely separated in space and independent of all time considerations, to create a joint text that accurately reflects all of their views; a text in which all contributions can (usually) be identified by source and time of composition; a text which, moreover, can be searched by author, date, or any other keyword recognized by the host computer.

What could be more suitable for coordinating the work of a large number of individuals? Considering the practices of American business, in which managers and executives spend 75 percent of their working hours "communicating" (either attending meetings, writing up reports of those meetings, or talking on the telephone), one might easily imagine that the corporate sector is busily investigating CC.

Here the imagination is running ahead of reality. It is true that business is exploring teleconferencing as a way of reducing the time, irritation and, above all, the expense of shuttling executives to all parts of the world to manage affairs that are increasingly global, rather than local. Every trade journal worth its controlled circulation has devoted its "special report" to the joys of teleconferencing. What they usually mean, however, is video conferencing.

The accompanying chart tabulates some of the differences between face-to-face meetings, video conferencing, and CC. Next to the elegance of CC, video looks like brute force. It demands a multi-million dollar investment to establish, and the coordination of many people, many miles apart, to set in motion. And in the end what have you got? A meeting in which only one person can speak at a time, whose transcript is always delayed, and whose results are skewed by body language and who-sits-where.

Satellite video communication has been shown to be a clumsy substitute for a face-to-face meeting, of little more value than an ordinary phone call. It demands so much extra equipment to establish special conference rooms that taking part in a video conference is like putting on a space suit to take a stroll around the block. (Bell Labs officials shunned their own Picturephone service, which required them to go to a special room, because it took more effort than it was worth.)

Clifford Barney

A Communications System Morphology

System parameter	Face-to-face	Video conferencing	CC
Medium of transfer	Verbal & nonverbal	Verbal & nonverbal	Written word; graphics
Effective group size limit	Unstructured: few tens Structured: hundreds	Few tens	Unstructured: many tens Structured: thousands
Occurrence of interaction	Coincidence of all	Coincidence of all	Individual choice
Frequency of interaction	Predetermined	Predetermined	Individual choice
Speed of interaction	Talking rate	Talking rate	Reading speed
System memory	Recordings	Recordings	Machine-readable
Memory modification	None	None	Electronic
Memory retrieval	None	None	Unlimited
Transformations	Transcription	Transcription	Hard copy
Structure	Varied but fixed once chosen	Single and fixed	Dynamic and adaptable

Adopted with permission from The Network Nation, *by Starr Roxonne Hiltz and Murroy Turoff; Addison-Wesley Publishing Co., Inc.; Menlo Park, CA 1978*

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CLIFFORD BARNEY

Communications Briefs

Cut-Rate telemail vendor fed up, abandons service.

Claiming that Telenet management is giving him the cold shoulder, Ed Magnin of the Telephone Software Connection has decided to quit providing low-cost Telemail service. Loss of TSC means that Personal Computer owners no longer have access to the cheapest and simplest electronic mail service heretofore available.

Telemail is a powerful, user-friendly electronic mail system operated worldwide by GTE Telenet over its packet-switched common carrier network. Telemail is normally marketed to businesses for $140/month plus a $500 minimum on Telenet connect charges. Acting as an independent broker, under an agreement with Telenet, Magnin bought the service and resold it. He charged $5/month plus the actual Telenet rates, with no minimum.

Magnin operated out of his home on a couple of microcomputers. Nevertheless, at one time last year TSC was the fourth-largest user of Telemail, billing around $5,000 a month. At least half his customers, Magnin says, were personal computerists who accessed the network after 9 p.m., when the Telenet rates dropped to $4/hour. (It is $14/hour in the daytime, $7/hour evenings.) Magnin mother-henned his clients, answering all messages personally, providing nearly a hundred state and special interest bulletin boards (including one devoted to the PC), and running interference with Telenet to correct customer problems.

But Telemail, Magnin charges, failed to provide the Telex service it promised, reneged on several agreements with TSC, confused billing by failing to separate network acess charges from charges for special services, and even miscalculated some bills. Telemail also failed to correct an annoying software glitch that caused long delays in transmitting messages to and from Magnin himself.

In the end, Magnin says, the headaches weren't worth the rewards. Periodically threatened with the loss of his large-user discount, and fearing a rise in Tlenet rates, Magnin abruptly decided to get out of the Telemail business as of Feb. 28. TSC will continue as a seller of telephone-delivered software (for Apple computers) via direct dial to TSC in Torrance, CA.

TSC's abandonment of Telemail prompted one user to comment that high network charges remain the principal roadblock on the "information freeway." At $15/hour, he predicted, information networks will remain "curiosities" for both personal users and businesses.

Telemail acknowledged that Magnin's complains were justified, and expressed regret that he was giving up the service.

Electronic mail only slightly expensive that TSC/Telemail is still available on The Source and the CompuServe network. Telemail, however, is more flexible and easier to use than these systems, which have rudimentary search software.

Publisher Folds Newspaper, Mounts Online Newsletter Service

The bottom line looks better in electronic publishing than in print to Independent Publications, Inc., which announced an online newsletter service less than a month after it folded the Philadelphia *Bulletin* newspaper. Under its Newsnet service, Independent Publications will distribute some 70 newsletters via telephone dialup lines. The first, already online, is *Communicotions Doily.*

The newsletter publishers will supply machine-readable text on magnetic tape; subscribers will be able to access the text at $24/hour (plus the newsletter subscription price).

Independent Publications shut down the once-proud *Bulletin* in January after many money-losing months.

Software Breakthrough...

NEW

NEW *QUIKPRO+PLUS* PROGRAM WRITES PROGRAMS FOR YOU ON YOUR OWN IBM-PC...in minutes.

Technical Review
by Wayne Hepburn

QUIKPRO+PLUS is the name given a new breakthrough in software, for the IBM Personal Computer, by FutureSoft

Until now, whenever you wanted a new separate BASIC program, you had to spend a lot of dollars to get it, or a lot of hours creating it That's in the past now.

Anybody who can turn on a computer can write a program, quickly, with this new *Quikpro+Plus* program generator It's the invention of Joseph Tamargo of Florida His brilliant approach to program writing allows you to tap the real power and speed of your computer (and it's about time.)

I located and interviewed him to find out more about *Quikpro+Plus* and pass this valuable information to you. He told me "The best part of this program is that it gives you a separate Basic program, produced in standard Microsoft Basic, every time you use it What's more, you can list your new program, look at it, see what makes it tick, and modify it."

I found out you can also enhance, alter, and even copy programs you create using *Quikpro+Plus*. I don't think there is any other program available with this much flexibility and ease of use.

The applications seem to be unlimited Uses occur in Business, Home, Hobby, Educational and Scientific situations A few examples of what *Quikpro+Plus* can write for you are programs like these

Financial Forecasting, Expense Planning, Data Access & Retrieval, Modeling, Record keeping of all kinds, Statistical Data Banks, and more *Quikpro+Plus* cuts program development time to a fraction of what it takes now It will generate File and Data Entry programs in a standard file format, allowing data to be downloaded to larger hosts or mainframe systems also.

HOW IT WORKS....

The operation of *Quikpro+Plus* is surprisingly simple and easy Right on your screen you answer questions, and you get error-free Filing and Data Entry programs. This eliminates the tedious development you normally to through in creating a new program Your instructions are right on the screen so you don't have to be a programmer to use it. Quickly, you have a new program that stands alone While some generator type programs give you bits and pieces, *Quikpro+Plus* gives you a complete, full running program. Then it will print out the operating manual of the new program for you

In addition to the functions of Data Entry, Updating, Retrieval and so forth, *Quikpro+Plus* allows you to generate a program that does Reporting on your printer. You can print out in a format different from your File format if you wish, without altering the file or record itself You can select what portions of which records will print or not print

Substantial mathematical ability is also incorporated into *Quikpro+Plus* generated programs You can perform all manner of calculations on various fields of data within individual records You can selectively do calculations and use the resulting data, or print it, without changing the original base data

I can't help but tell you I was really impressed with the range of uses and the power of this program I saw a list of over one hundred applications you could do right now and of course you can dream up as many of your own as you want

There were letters from owners who wrote to comment on the program and I read some of them They came from all kinds of users, doing all kinds of things, with this automatic program generator that writes a separate Basic program for you each time you use it. They had saved a small fortune by getting numerous separate applications from it and they can keep on doing it, year after year. Of course, you can too, once you have a copy of *Quikpro+Plus* to run on your own IBM Personal Computer

I had checked on some other firms advertising program generators and was disappointed to find out they were running ads but were not ready to deliver FutureSoft has already delivered and is accepting orders even as I write this report to you. They even give you a full guarantee of satisfaction..allow you to obtain *Quikpro+Plus*, run it on your computer, and if not fully pleased return it within 10 days of delivery. I thought that takes a lot of confidence, but then, they have every reason to be confident based on the remarkable performance of the product

You get *QUIKPRO+PLUS* by mail or phone direct from FutureSoft Send mail orders, specifying for IBM-PC, to FutureSoft, Box 1446-PC, Orange Park, FL 32073 Include your check or money order for only $259 (Florida residents add 4% sales tax). Or you can order by phone, Toll-Free 24 hours daily if you have Visa or Mastercard Call 1-800-824-7888, operator 120, all states except California residents, who should call 1-800-852-7777, operator 120 The operators are not technically competent to answer any questions about the product.

By the way, you Software Dealers reading this report will be glad to know you can handle *QUIKPRO+PLUS* in versions to run on many popular computers. Contact FutureSoft directly, by mail, or phone the office at (904) 269-1918

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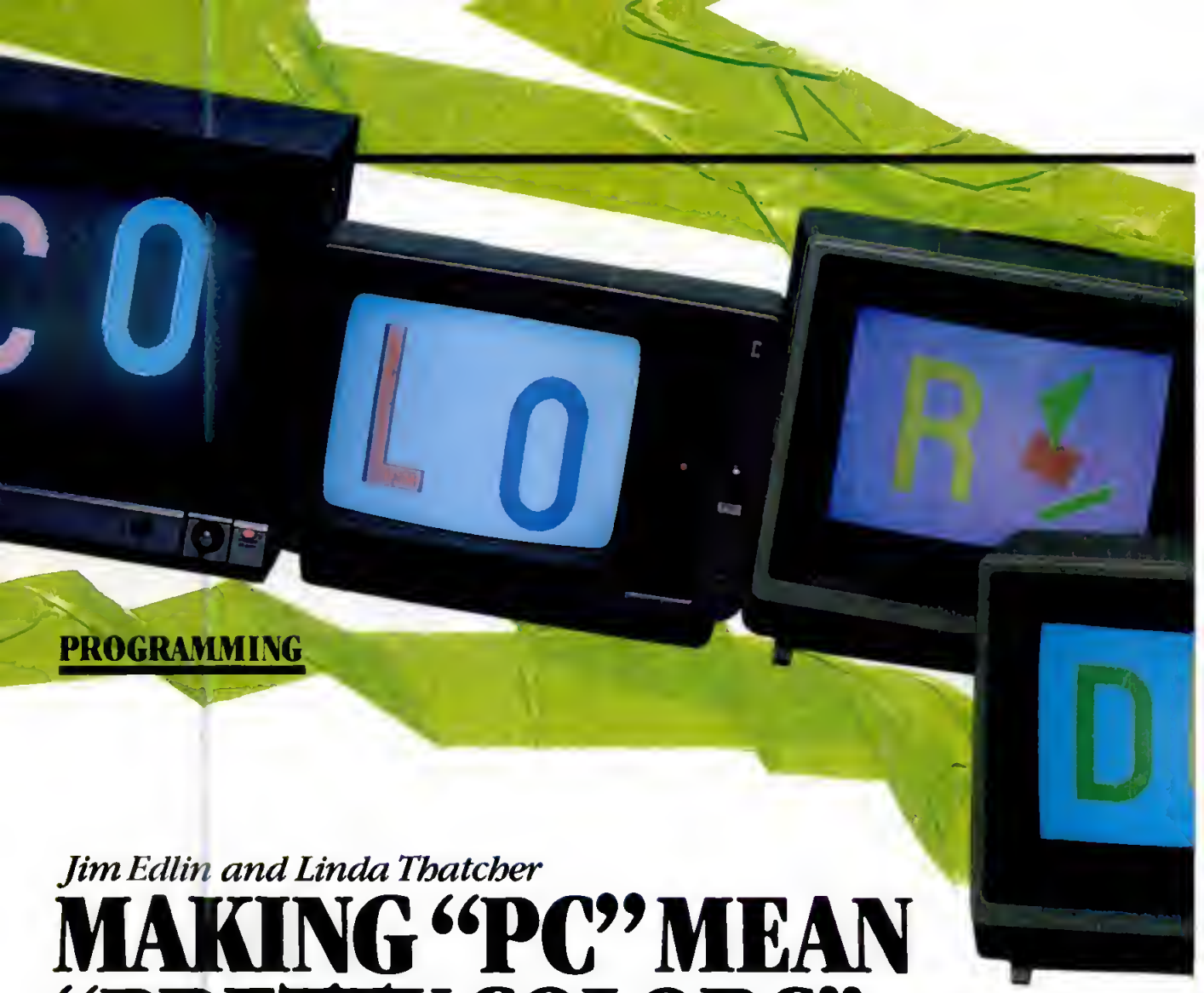


PROGRAMMING

Jim Edlin and Linda Thatcher

MAKING "PC" MEAN "PRETTY COLORS"

If you want to equip your IBM Personal Computer to display color text and graphics, the number of possible ways is in the same league as cat-skinning.

At present, however, all the ways have one common prerequisite: you must first equip your PC with IBM's color/graphics display adapter, an investment of approximately $300. (This does not mean you can't also have/use the monochrome display adapter; the two are designed to function in tandem.) After you've acquired the adapter, depending upon your needs and desires, you can achieve color display capabilities for an additional $70 or less (assuming you already own a color TV), or you could add another $1,000 or more to the cost of your system.

The factors determining your location in that spectrum should be the immediate uses you have in mind for color plus the amount you care to invest in being prepared for the future. The overwhelming, 'right-now' consideration is *resolution*, i.e., the level of detail and sharpness the display is capable of reproducing. Resolution is measured by how many dots (in a horizontal line) and how many lines (vertically) can be distinctly and separately displayed. The PC is capable of producing 640 distinct dots (320 in color) on 200 distinct lines, at two levels of brightness for each. How much of that resolution you need depends upon the programs you plan to buy or write. The future consideration is this: do you want to be prepared for color adapters or other devices capable of even greater feats of resolution, as well as for the programs that might exploit them? (A future intersection of microcomputers and video disks is worth consideration at this point.)

There are three basic options to consider, as well as arrays of secondary choices within each. Since the marketplace is still adjusting to the new opportunities created by the PC, the choices are not as clear-cut as they could be; the present lack of a substantial body of published, color-using programs is also a significant factor.

Hardware Choices

The color/graphics adapter has three different places where a display can be connected; these connections define the three categories of hardware that can be used. Each connection point enters at a different stage of the electronic process that paints color pictures onto a video screen.

To understand the choices, it helps to have a rough conception of how video's ephemeral painting process works. The image you see is built up from three superimposed pictures, each of which is a single, pure color, i.e., one of the three "additive primaries," or red, green, and blue. (These are slightly different from the paint-pot "subtractive" primaries you

splays and equipment courtesy of Computer Connection, San Francisco; ComputerLand of San ancisco; ComputerLand of the Castro.

Graphics display program by Lon Poole, photographs by Ed Kashi.

learned about in elementary school.) The triple images are built up by ever-sweeping electron beams that, when energized, make phosphor spots on the screen glow in color.

For the simplest of systems, imagine the computer keeping track of each beam's regular, repeated sweeps, energizing it whenever it is aimed at a spot where its color is desired. Displays that work according to this system are called *RGB* (for red-green-blue) monitors. Since RGB is the simplest approach, you might expect it is the least expensive; but, in fact, it costs the most. One reason for the expense is that the economics of color displays are influenced far more by television use, which is a multi-million-unit business, than by computer use, which is still relatively rare. RGB monitors are also more of a precision device than is a mass-produced TV. A D-shaped, 9-pin jack on the back of the IBM color adapter provides signals for an RGB-type display.

In broadcast television, the signals defining the three superimposed color pictures go through two additional stages of processing. First, the signals are combined to form one "composite" signal. Then, the composite picture signal is overlaid onto a broadcast carrier signal. The steps are similar to music from a guitar, drum, and piano being combined into a single signal in a record groove, then that signal being incorporated into a radio wave when the record is broadcast. To recreate the picture at the receiving end, both the overlaying and combining processes have to be performed in reverse. For a computer to send a picture to a broadcast-oriented display, it must take on one or both functions of a miniature television station.

The device that acts as a TV transmitter is called an "RF (for radio frequency) modulator." These can be bought for $70 or less, and will allow the IBM color adapter to send pictures to your standard color TV. RF modulators are connected to the IBM color adapter unit on a multi-pin plug inside the IBM system near the back of the circuit board.

If a TV set is equipped to let you bypass the broadcast receiving stage via a separate connector, or if you select one of the special-purpose displays that omits the broadcast part, your PC can send it the composite video signal, which comes from the round, stereo-like jack at the back of the color adapter.

The three main hardware choices, then, are a TV set with RF modulator, a composite video monitor, or an RGB monitor. What factors influence the choice between them?

The Trade-offs

If, as a child, you ever played the game "telephone," you know that the more times information is handled, the more

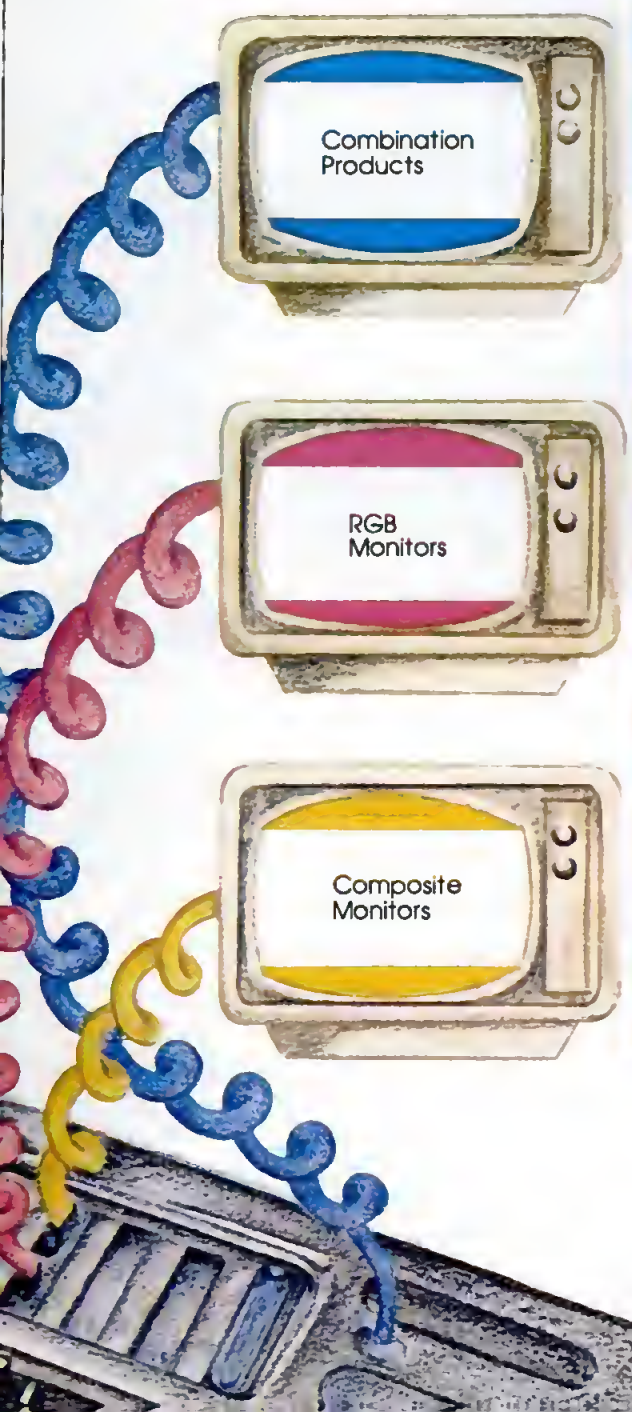
Color Displays

likely it is to become distorted. That effect is what makes the RF modulator/TV set combination least desirable, and makes even composite monitors a compromise. The extra handling tends to mush up the sharpness of the picture.

A second major limitation is that TV sets are designed to adhere to a standard, i.e., a specified way of sending TV signals that is uniform within the US (other nations also have broadcast standards, most of which are different from ours). Among other things, the standard defines the size of the channel, or bandwidth, which may be used for the picture information. Your computer could be capable of sending more picture detail, as the ICM PC is, but the bandwidth 'door' in the display is too small to let it through. Since composite monitors are usually built to television standards, they also suffer from this limitation. (A composite monitor designed to higher-bandwidth standards could approach the sharpness of a similarly designed RGB monitor, but would still lose quality because of the extra handling to make the composite signal.)

In the case of RGB monitors, which are liberated from the constraints of the broadcast-TV standard, the limitations

Color Displays: What's Available



Make/Model	Physical			
Electrohome C50-050	13"	21.5 × 13.25 × 17.25	60	◆▲△●○■□
RCA VFM 575	19"	25.5 × 17.12 × 17.36	55	
Sony KX 1901	19"	19.88 × 17.88 × 19	72	■□▽
Amdek Color II	13"	17 × 14.5 × 15	32	◆▲△●
Data Ed/Teco TN1440	13"	18.5 × 14.8 × 13.6	31.6	◆▲●
Electrohome ECM 1302-1	13"	18.5 × 13.31 × 14.61	35	◇▲
Electrohome ECM 1302-2	13"	18.5 × 13.31 × 14.61	40	◇▲
Hitachi CM 1472	13"	17 × 14.75 × 15.2	32	◇▲△●
NEC JC 1202 DH (A)	12"	14.88 × 12.08 × 16.26	25.79	◇▲
Amdek Color I	13"	17 × 14.5 × 15	32	◆▲△■□
BMC 12 CL	13"	—	—	◆▲△■□●
Heath GD2-1320	13"	20.25 × 14.00 × 14.75	33	◇
Hitachi CN 1481	13"	17 × 14.75 × 15.2	25.6	◇▲△■□●
NEC JC 1201M	12"	14.88 × 12.02 × 16.26	25.79	◇▲
Sharp XR 3013	13"	19.84 × 15.33 × 15.85	37.7	
Zenith DC13PF2	13"	20.25 × 14.00 × 14.75	33	◇

Screen Size (diag) | Cabinet Size (in W × H × D) | Weight (lbs.) | Controls on Front

◆ On △ Contrast ● V-Hold
◇ On/Vol ■ Tint/Hue ○ H-Hold
▲ Brightness □ Color ⧗ Sharpness

arise from manufacturing precision. Theoretically, an RGB monitor of unlimited picture resolution is possible, but reality intervenes with how small and how precisely you can place dots of phosphor on the screen and drill patterns of microscopic holes, and so forth. It is these differences that account for the variation in both the performance and the price of different RGB displays.

RGB monitors for use with computers are often set up to be digital, implying that they can be told whether a color dot should be on in a particular place, but not how bright it should be. IBM shook up this status quo by equipping the PC color card to display two levels of brightness. As our "What's Available" survey shows, the marketplace is scrambling to respond. (Since composite monitors and TVs are broadcast-oriented, they are designed to reproduce levels of brightness.)

So the "bottom line" is this: *TV sets*—easy on the pocketbook but hard on the eyes; fine for games and low-detail graphics; limited to 40-column width for text, and even then, tough to look at for long. *Composite monitors*—almost as limited as TV sets, but will be easier on the eyes. *RGB monitors*—the only display

			Picture/Sound			Miscellaneous			Comments
td. TV	Yes	65 W (note 4)	256 × 200	6 (8 gray)	?	$972	Now, ind. dlrs	1 yr. P&L	Base unit for complete Videotex system.
ulator	Yes (2)	110 W	525 lines (note 3)	N/A	Yes	$599.95	May '82 indep. dlrs.	90 days L, 1 yr. P	An enhanced, upper-end TV set.
Multi	Yes	130 W	340 lines (note 3)	N/A	Sep. Sys.	$1,500	Now, Sony dlrs.	Not stated	"Proteel" model, also avail. in 25" version (KX2501).
in	Yes	70 W	560 × 240	8/16 (2)	Yes	$995	Now, Computer-Land, IBM & ind. dlrs.	1 yr. P&L, 2 yr. tube	16-col. stand. after 3-1-82; earlier models can be upgrad.
DIN	No	70 W	360 × 230	8/16 (2)	Yes	$599	Now, dealers or direct from Co.	90 days P&L	Lowest reso. of RGB monitors that release specific figures.
Plug	Yes	65 W (note 4)	"Medium"	N/A	?	$570	Apr. '82 ind. dlrs.	1 yr. P&L	Comp. or RGB input. Different video tube from mod. 1301-2.
	Yes	65 W	"High"	16	?	$978	Apr. '82 ind. dlrs.	1 yr. P&L	Canadian manu. Preferred for color text display.
in	Yes	70 W	560 × 240	16	Yes	$950	May '82 ind. dlrs.	90 days	Equivalent to Amdek Color II.
in	No	67 W	690 × 230	8	?	$1,095	Now, ind. dlrs.	90 days P&L	Highest reso., most expensive, not capable of 16 col.
Plug	Yes	65 W	260 × 300	N/A	Yes	$449	Now, Computer-Land, IBM, ind. dlrs.	1 yr. P&L, 2 yr. tube	
Plug	?	?	?	N/A	?	$450	Now, ind. dlrs.	?	Several specifications not supplied by mfr.
Plug	No	82 W	240 lines (note 3)	N/A	Yes	$399.95	Now, Heath centers & catalog	90 days P&L	Most controls at back, could be inconvenient.
Plug	Yes	65 W	260 × 240	N/A	Yes	$450	Now, ind. dlrs.	90 days	
Plug	No	67 W	340 × 240	N/A	Yes	$399	Now, ind. dlrs.	90 days P&L	
Plug	?	110 W	300+ lines (note 3)	N/A	?	$	Now, ind. dlrs.	90 days P&L	Also avail. in 19" model (XR3019).
Plug	No	82 W	240 lines (note 3)	N/A	Yes	$399.95	Now, Zenith dists.	90 days P&L	Same as Heath model GD2-1320.

Connection / Cable Provided? / Power Used (note 1) / Resolution (H × V) / Colors / Sound / Suggested Retail / When/Where Available / Warranty

Chart. Research, Linda Thatcher. Design, Cantoo Graphics

Normal/RGB Selection Switch

NOTES:

(1) All models 110/120 volts, 60 HZ unless indicated otherwise

(2) Basic model can reproduce 8 colors, add on modification allows display of two intensity levels for 16 total "colors."

(3) Mfr does not release horiz. resolution information.

(4) Also capable of 220/240 volt, 50 HZ. operation.

typa capabla of showing the picture definition the PC is capable of producing; costly, but essential if you want to work extensivaly with color text as well as graphics and use 80-charactar-wide lines; however, not all RGB models can achieve the resolution of tha PC.

The Survey

To help you gain an idea of the color display products available, *PC* undertook a survey. Our explorations consisted of talephone conversations with manufacturers and distributors, careful raviews of specification sheets, and visits to retail outlets. The fact we learned most clearly is that tha information we were seeking is hardar than expected to come by, and also a little slippery. What we were abla to laarn is summarized in the table that accompanies this article.

Some products are antecedents of a generation that aspires to equip your "media room."

Except for ona RCA unit, we did not specifically survey TV sets. In general, a TV set's quality as a color display for your PC will be proportional to its quality as a TV set. We did not specifically survey RF modulators either, but the one we ran across was tha Sup*R*Mod 5, from M&R Enterprises in Santa Clara, California. This unit sells for approximately $60 and comes with the plug needed for connection to IBM's adapter. Plugging it in properly, however, can be tricky and we suggest you have it installed for you, if possibla.

The othar products we surveyed fell into three categories: composite-type and RGB-type monitors, plus some combination products intanded for more than one purpose. Most of the displays were suitable for top-of-the-computer placement, but thera wera a faw biggias more suited to group viewing. Our chart reports the screen siza (in inches) measured diagonally from cornar to cornar, the cabinat siza and waight, and the controls that are aasily accessible from the front. Composite displays require more controls for adjustment and are likely to need more frequent fiddling, so we thought you'd lika to know which ones you could get at without moving tha monitor or trying to locate tha knobs by feel alone. Some of the front controls are recessed or hidden behind doors. Tha chart does not indicate cabinat material or color; although none of tha cabinets fits in with the look of the PC as nicely as IBM's own monochrome display does, most RGB displays are some shade of gray. Powar requirements ware fairly uniform; only tha Elactrohome displays were equipped for outside-the-US power standards. Smaller screans, in general, draw about as much powar as a 60-watt bulb, 100 watts being the cluster point for big screens.

In the video specifications, we report resolution information to the extent manufacturers were willing—or able—to supply it; wa did not investigate this ourselves. Many companies simply don't release horizontal dot resolution, and no one but Teco and Amdek were able to talk about bandwidth as such; a pity, sinca it's a useful measure, we think. The column entitled "Colors" applies only to the RGB monitors, since the othar kinds of display can raproduce all colors. Most of the RGB monitors wa found were limited to displaying tha eight basic colors in IBM's video palette (black, white, red, green, blua, yellow, magenta and cyan, which is a lightish blue). Electrohome's RGB model was set up for IBM's full 16 colors (the eight above plus eight shades with different brightness, e.g. black becomes dark gray), as is Hitachi's and Amdak said all their production would be thus modified after March 1, and provides a kit that would convert earlier specimens of its Color II model to 16-color capability. Most other makers said a change to 16-color capability was in the offing, or offered modification kits.

Many models included built-in sound capability. This is of no immediate use with the PC, which has its own built-in speaker and does not transmit sound through the color display adapter. However, this feature may be worthy of consideration with regard to future uses for your monitor.

Several different connector types were provided for delivering the video signal to the display. They are listed as they were reported to us, but don't be confused by the various names, many of which are the company's own version of standard connectors. All you need to know is that if there isn't an RCA plug on the computer's end of tha cable for a composita display, or a 9-pin plug for an RGB display—or, worse, no cabla provided at all—either you or your dealer is going to have to do some fooling around to make the connection.

Warranties tended to be the 90-day variety, although a few companies (RCA, NEC, and Electrohome) offered a yaar on some models, and Amdak stretched that to two years for the tuba.

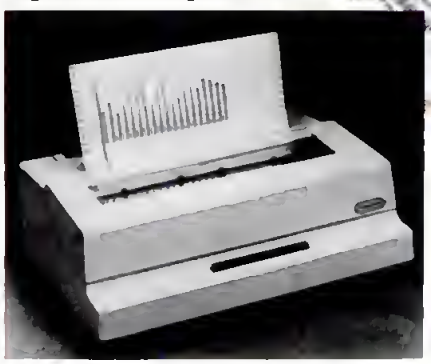
Some products we looked at, notably the Sony Profeel series, had aspirations broadar than serving as a display for your Personal Computer. Thay are tha antecedants of a product generation that aspires to equip your "media room" and hook up to videodisk players, cassette recorders, and who-knows-what-else. However, many of their self-adjusting features could be a hindrance rather than a help so far as computar display is concerned. One Electrohome model in our chart is set up to work with vidaotex (ramote information library) systems such as Telidon in Canada, whara Electrohome is based.

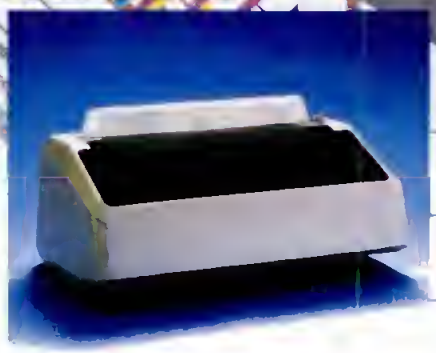
The bottom line is that RGB monitors are the only display type capable of showing the pictures the PC can produce.

In trying to get information from some large companies, we found them very confused about where in their organizations computer displays belonged—or ought to belong. RCA, in particular, seamed to hava no idaa what we were talking about; fourteen (long-distance) phone calls and three divisions later, we gave up on Zenith and called our local Heathkit Electronics Store, which provided us with tha information wa naaded. Smaller companies, particularly Amdek, seemed to be most interested in serving the IBM PC market. The bulk of tha composite monitors we surveyed seem to owe their existence largely to serving the Apple computer market, and seemed far less relevant to tha needs of the PC.

The Last Step

COLOR PRINTERS





The PrintoColor (l) and Prism (r) printers, and samples of their output.

Whether you are using color to interprat data, enhance text, or anrich pictures, its advantages can be substantial. But with a color display alone, you can enjoy thosa advantages only when you are where your computer is. An ideal setup would include ability to translate your color displays into more portable form, i.e., print them on paper. This option is not available yet except to those with plenty of technical prowess; but the wait may not be long. In the maantima, your camara can fill the breach in some situations.

Manufacturers of two relatively low-cost color printers have stated intentions of customizing their products for the IBM PC in the near future. One of these is Integral Data Systems, Inc. (IDS), of Milford, New Hampshire. For $1,995, IDS sells a printar, called the Prism, that is capable of printing in seven colors—though the color set (cyan, magenta, yellow, green, purple, brown and black) does not exactly match the PC's displayed set. The Prism is a dot-matrix type printer with a multi-color ribbon that makes multiple passes across each line where more than one color is to be printed.

You could plug a Prism into your PC now and print in color if you wrote your own programs to do so, but there isn't any convenient way of simply reproducing a color image on your display onto paper. Peter Eisenhauer, director of marketing for IDS, says a remedy for this lack is underway. According to Eisenhauer, a PC now resides in the IDS engineering department, where the top priority project is to develop an interface which will allow automatic printout of PC color screen images. Eisenhauer also points out that the Prism is a modular system, so a buyer could begin with the basic printer ($899), then add the plug-in to upgrade to color capability at a later date.

A color printer that uses a different process is the PrintaColor, from a corporation by that name in Norcross, Georgia. The PrintaColor uses fine jets of color ink shot at the paper to create its image, and it seems better at covering large color areas than the Prism but poorer at text. PrintaColor's unit prints with only three colors of ink, omitting black, and as a result is able to create only a muddy gray-brown where black is desired. Its palette also does not quite match the PC's screen colors. Suggested retail price for the least expensive PrintaColor model is $3,995, and Daniel Byford, a spokesman for the company, says it too is working on an adapter that would allow easy control by IBM PCs.

Yet another option might be a color plotter like that recently introduced by Hewlett-Packard to sell for $1,595. Plotters work by moving colored pens around on a sheet of paper. For displays that ara more graphic than text, tha H-P plottar seems to do a slicker (if slower) job. But the colorful sample distributed by the company is somewhat misleading. It shows a lovely multicolor set of graphs, but the plotter appears capable of using only two colors at a tima without human intervention. A colorful image like H-P's sample would, as we understand it, require several changes of the felt-tip pens inside the machine. The H-P plotter is now on the market, and could be connected to the PC's asynchronous communications adapter or equivalent, but again the lack of software specifically designed to control it means it would not be especially useful to most people.

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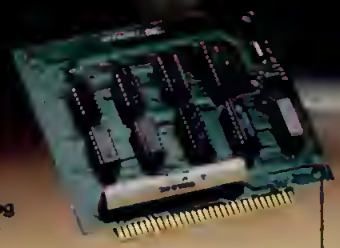

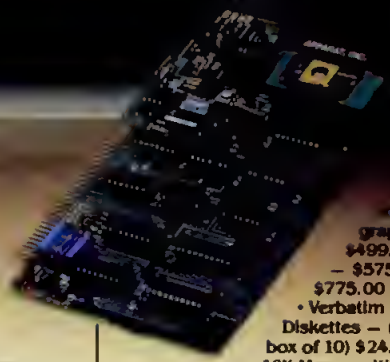

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- 2 Single Headed 40 Track Drives — 320K of disk storage, easy internal mount. $450.00
- 48K additional RAM — 27 chips plug into master PC board $75.00
- Add-on Memory Card — (uses 64K dynamic RAM chips), 64K — $425.00, 128K — $525.00, 192K — $625.00, 256K — $725.00
- Prom Blaster — Programs most 1K to 4K EPROMS of 25XX and 27XX single or multivoltage, personality modules, read/write software. $149.00
- Apparat Game Diskette — $24.95
- Clock Calendar — Features seconds, minutes, hours, day of week, date, month and year, backup battery, leap year and crystal time base. $129.00
- Prototype Card — 3.5 by 8 inch wirewrap holds 150-14 pin dips. $29.95
- RGB Color Monitors — Includes cable, 16 color modifications, NEC — $1,095.00, AMDEK — $899.00, TECO — $699.00.
- 3rd and 4th Add-on Drives — Expansion cabinet and IBM compatible drives, cabinet and 1 drive — $499.00, two drives — $749.00
- 64K Hardware Print-Spooler — Parallel printer adapter, buffers 15 minutes of output at 80 characters/second. $399.00.
- EPSON MX Printers — MX-80 (with dot graphics) — $499.00, MX-80 F/T — $575.00, MX-100 — $775.00
- Verbatim Datalife Diskettes — (5-1/4" 40 track, box of 10) $24.95
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"ON GOING SUPPORT FOR MICROCOMPUTERS"

Lon Poole

COLOR GRAPHICS

A hands-on, how-to introduction to PC BASIC's powerful graphics commands

Discuss computers these days and it's guaranteed that you will hear the words "computer graphics." Computer salespeople, buyers, owners, and ordinary users all agree that a machine's graphics capabilities are a good measure of its worth, and PC votaries are no exception. Not only does the PC have excellent color graphics capabilities when the color graphics adaptor board is installed, but it really is quite easy to include graphics in any PC BASIC program.

What Is Graphics?

Before I discuss programming graphics displays, let's take a look at what computar graphics is. Some people believe that computer graphics is intricate spiral line drawings or blocky, bright-hued cartoons, while others envision the on-screen action of thair favorite arcade gama. All these viewpoints have one thing in common: they assume that computer graphics are only a means of entertainment.

Although graphics can entertain, they are a powerful aid to comprehension and can inform people in a way that no report can. Most people are intimidated by the profusion of numbers of a typical computer report. Not only do graphics attract, and maintain, a user's attention, but they process raw numeric data and make it easier to understand. Which can you grasp faster, a list of seven-digit numbers or a graph that shows their relative values at a glance?

Of course, graphics can no more replace reports than pictures can replace poems or movies replace novels; exact, to-the-penny numbers document the accuracy of accounting reports. All too often, however, a financial analysis requires poring over columns of dry statistics. That's where a computer graphics program can be an indispensable tool, allowing the computer to wade through the numbers and display a picture of the results on the screen.

A Graphics Application

Let's take a look at a practical application. The BASIC program accompanying this article is based upon one which appears in *Some Common Basic Programs* by Lon Poole and Mary Borchers (Osborne/McGraw-Hill, 1979) and employs the statistical technique of exponential regression to calculate the average growth rate of a value at regular intervals of time, and then to project the extent to which the numbers will increase or decrease in the future. Analysis of this type is useful in evaluating and predicting sales, costs, patronage, and other factors that usually grow or decay at an exponential rate.

This article explores the PC BASIC graphics statements used by the program. You can enter the growth-rate program in the computer as is and use it on any PC equipped for color graphics. A step-by-step analysis of tha program itself appears with the program listing, and Fig. 1 shows the starting phase of the program, i.e., tha point at which the data on the program works is entered.

Ways To View Your Data

As originally written, the Average Growth Rate program displays the average growth rate percentage and the exact values of future projections. Fig. 2 shows how this looks on a monochrome monitor. Although the projections are only estimates, the exact numbers are not as important as the magnitude of those numbers and the overall trend, features which are easier to see when the data is displayad in graph form.

One way to graph data is to plot each number as an individual point. Fig. 3 shows the data from Fig. 2 in a point graph on a color monitor. The color not only enhances the appearance of the display, but also imparts more information: red points are past data and green points are projections.

Drawing lines between the plotted

Lon Poole, author of severol books including The Apple II User's Guide ond Some Common Bosic Progroms, has recently turned his ottention to the IBM Personol Computer.

points can further enhance the data. Fig. 4 displays the same data as Fig. 3, but now the red and green dots are connected by colored lines which add more color and make the trends more transparent.

A bar graph of the data in Figs. 2-4 offers a completely different look, as illustrated by Fig. 5. All this color on the screen has a very dramatic impact.

Any one of the preceding graphics displays offers a substantial improvement over the ordinary report format in Fig. 2. The differences between the graphics displays are mostly aesthetic; different people will have different preferences. Fortunately, the PC creates point, line, or bar graphs with equal ease.

PC BASIC Graphics

On the PC, all three versions of BASIC make it easy to transform verbal output to graphics output. Cassette BASIC, Disk BASIC, and Advanced BASIC can all plot points and draw lines and boxes. The only special equipment you will need is a color graphics adapter and a color display screen.

Advanced BASIC has other graphics capabilities as well. It can draw circles, arcs, and ellipses, and can fill in any area of the screen with a solid color. Advanced BASIC requires at least 48K of random access memory (RAM), one disk drive, and IBM's disk operating system (DOS).

Although BASIC graphics on the PC is easy, it's not for the rank beginner, so it's a good idea to practice with some of the staples of BASIC before beginning to use graphics. PC BASIC's graphics statements will augment the standard BASIC statements, but they will not replace them. You still need to know how to use statements such as PRINT, INPUT, FOR, NEXT, DIM, and LIST.

Foreground, Background, and Border

The display screen has three different regions: border, background, and foreground. Background, as the name implies, is the region of the screen on which everything is displayed. When you turn on the PC, the background region is the black part of tbe screen which can have characters on it. Text and graphics images appear in the foreground, superimposed on the background. The background has a border around it which is not visible when the computer is turned on because both border and background are black The border compensates for variations

The Difference Color Graphics Makes:

Fig. 1.—Data entry for Average Growth Rate (AGR) program

Fig. 2.—AGR program numeric output

Fig. 3.—AGR program point plot

Fig. 4.—AGR program line grapb

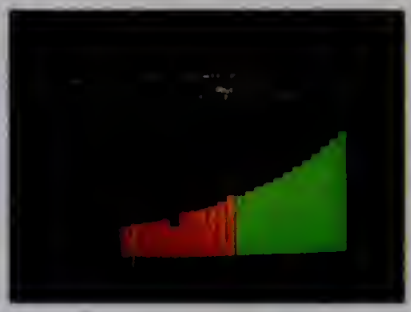

Fig. 5.—AGR program bar graph

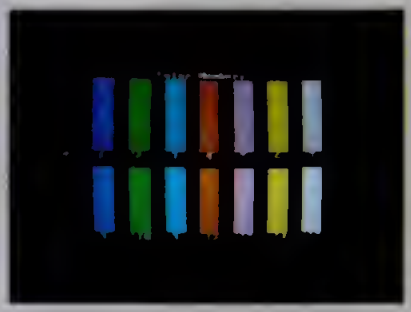

Fig. 6.—Text colors and color numbers

Fig. 7.—Graphics palette and color numbers

Fig. 8.—A diamond drawn by the listing in text

between different televisions and monitors by providing a safety margin against overscan, the tendency for the image at the edges of the screen to be partially or completely lost.

The COLOR Statement With Text

In PC BASIC, the COLOR statement allows you to specify different colors for foreground text, background, and border.

"Which can you grasp faster, a list of numbers or a color graph that shows their relative values at a glance?"

Colors are specified by number, as illustrated by Fig. 6, which correlates color numbers with actual colors. Color numbers 0 through 7 are available for foreground, background, and border, whereas colors 8 through 15 are available in the foreground for text only. Some color displays will show tha same colors for numbers 8 and 0, 9 and 1, 10 and 2, etc., even though the computer sends out different signals. The following statement changes foreground color to magenta:

COLOR 5

The COLOR statement affects only the foraground color of items entered (typed) ofter it is executed; text that is already onscraen will not change color. Any text displayed after a COLOR statement changes foreground color will be in the new color. Aftar executing the statement above, the PRINT statement below will be magenta when it is entered, as will its output when you press the RETURN key to executa it.

PRINT "Waltz of the Toreadors"

Waltz of the Toreadors

The next statement makes the foreground color magenta and tha background color blue:

COLOR 5, 1

The background color immediately changes throughout the screen; as bafore, the foreground color change is not retroactive.

To make the foreground magenta, the background blue, and the bordar white, use this statement:

COLOR 5, 1, 7

The border color and the background color change at once; the change of foreground color only affects future text.

As you can see from the examples above, the first number in a COLOR statemant specifies the foreground color, the second number specifies the background color, and the third number specifies the border color.

Omitting any of the numbers in a COLOR statement results in the color of the item you omitted remaining unchanged. For example, this statement changes tha background color to cyan without changing either the foreground or tha border colors:

COLOR , 3

Notice the comma ahead of the 3. It indicates that the first number, which selects the foreground color, is to remain unchanged. Two commas ahead of a number mean that it is the third (border) number, and that the first and second numbers, which select foreground and background colors, respectively, are unspecifiad. For example, to change the border color to green without altering tha foreground or background colors, anter:

COLOR , , 2

Text and Graphics Modes

Everything discussed so far pertains only to a display used purely for text, which is called text mode. In text mode, any of the 256 characters in the PC character set can ba displayed. The presence of the color graphics adapter allows the use of two additional screen modes (In BASIC), both of which are graphics modes. In these modes you can plot singla points; draw lines, boxes, circles, and arcs; and color the interior of delineated areas. The addition of these abilities allows a user to construct elaborate pictures which can be displayed together with any of the 256 taxt-mode characters.

The PC BASIC graphics modes differ only in tha number and size of the points displayed and in the number of colors allowed. *High-resolution* moda dividas the screen into more points than *medium-resolution* mode; consequently, high-resolution points are about half as wide as medium-resolution points. High resolution is strictly black and whita, whereas medium resolution allows as many as four different colors to ba used on the screen concurrently.

Switching Screen Modes

The SCREEN statement allows a user to switch between text and graphics modes. The following statement switches to medium-resolution graphics:

SCREEN 1

This statement switches to high-resolution graphics:

SCREEN 2

To switch back to text mode, use this statement:

SCREEN 0

The SCREEN statement erases tha screen and sets the foreground color to white, the background and border colors to black. (Although tha SCREEN statement offers other options, in this articla we'll use only tha simpler forms shown abova.)

The COLOR Statement With Graphics

The COLOR statemant is actually two statements in one. COLOR works one way in text-mode, another way in tha medium-resolution graphics mode, and is illegal in high-resolution graphics mode, in which the foreground color is always white and tha background and border colors always black.

In medium-resolution graphics, the COLOR statement has no border color

"You can plot single points; draw lines, boxes, circles, and arcs; and color the interior of delineated areas."

specification. The border is always the same color as (and thus is indistinguishable from) the background, which can be any of the 16 colors in Fig. 6. The choice of medium-resolution foreground colors is limited, and tha scheme for specifying tham differs markedly from the text-mode schema.

The COLOR statement chooses one of two sets of madium-resolution foreground colors; these sets ara referred to by IBM as *palettes*, and each has four colors. Once the palatte is chosen, the statements which actually plot and draw on the medium-resolution graphics screen can choose individual colors from it. To understand the parametars of tha palette's use, imagine an artist painting a picture. She has two palettes of paint on her

Average Growth Rate Program

```
10 KEY OFF
20 CLS
30 WIDTH 40
40 DIM F(24)
50 PRINT "      Growth Rate and Projections"
60 PRINT
70 PRINT
80 PRINT "    This program analyzes sales or other figures from past months,
     computes an average growth rate, and projects future figures.
     You specify the number of past and future months."
85 PRINT "  The total number of months cannot exceed 24."
90 PRINT
100 PRINT

200 INPUT "How many past months";M
210 INPUT "How many months to project";P
220 IF M+P>24 THEN PRINT :PRINT "ONLY 24 MONTHS TOTAL, PLEASE!":GOTO 100
230 PRINT
240 PRINT "How enter amounts for past months:"
250 PRINT
260 FOR J=1 TO M
270 PRINT "Month";J
280 INPUT F(J)
290 NEXT J

300 T=LOG(F(1))
310 V=0
320 FOR J=2 TO M
330 L=LOG(F(J))
340 T=T+L
350 V=V+(J-1)*L
360 NEXT J
370 A=6*(12*V/(M-1)-T)/M/(M+1)
380 A=EXP(A)-1
390 AGF=EXP(T/M-A*(M-1)/2)
400 FOR J=M+1 TO M+P
410 F(J)=INT(AGF*(1+A)^(J-1)+.5)
420 NEXT J
430 MIN=F(1)
440 MAX=F(1)
450 FOR J=1 TO M+P
460 IF F(J)>MAX THEN MAX=F(J)
470 IF F(J)<MIN THEN MIN=F(J)
480 NEXT J
490 S=168/(MAX+MIN)

1000 CLS
1010 FOR J=1 TO M+P
1020 IF J>M+P THEN J=24:GOTO 1050
1030 PRINT
1040 PRINT "Month";J;TAB(10);F(J)
1050 NEXT J
1060 PRINT TAB(18);"(Growth Rate:";INT(A*10000+.5)/100;"%)"

1100 GOSUB 2000
1110 FOR J=1 TO M+P
1120 IF J>M THEN C=1
1130 PSET (J*11+45,200-INT(S*F(J))),C
1140 NEXT J

1200 GOSUB 2000
1210 PSET (56,200-INT(S*F(1))),C
1220 FOR J=2 TO M+P
1230 IF J>M THEN C=1
1240 LINE -(J*11+45,200-INT(S*F(J))),C
1250 NEXT J

1300 GOSUB 2000
1310 FOR J=1 TO M+P
1320 IF J>M THEN C=1
1330 LINE (J*11+45,200)-(J*11+54,200-INT(S*F(J))),C,BF
1340 NEXT J

1400 A$=INPUT$(1)
1410 SCREEN 0,0,0
1420 RUN

2000 A$=INPUT$(1)
2010 CLS
2020 SCREEN 1,0
2030 COLOR 0,0
2040 C=2
2050 PRINT "        Average Growth Rate Is ";INT(A*10000+.5)/100;"%"
2060 PRINT "Amount"
2070 PRINT "  )|   <------------ Month ------------>"
2080 PRINT "  \/   1  3   6   9   12  15  18  21  24";
2090 FOR J=5 TO 25 STEP 5
2100 LOCATE J,1
2110 PRINT INT((168-(J/5-1)*40)/8+.5)
2120 NEXT J
2130 RETURN
```

work table, but can only hold a single palette at a time. When she chooses to use one palette, she can only paint with the colors on it. In order to paint with tha colors on the othar palatte, sha must put down the one sha is holding and pick up the other. The medium-resolution graphics display works in the same way, but with one variation—when a user changes from one palette to another, the colors on the screan changa from tha colors of the first palette to tha colors of tha second.

"It's really quite easy to include graphics in any PC BASIC program."

As you might axpect, the palettes are numbered zaro and ona, and tha colors on them ara numbered from zero to three. Fig. 7 correlates actual colors with palette and color numbers. Notice that on each palette, color numbers 1, 2, and 3 ara fixed. Color number 0 is, de focto, fixed, since it is always the same as the current background color. Text printed on a medium-resolution screen appears in palette color number 3, i.e., either in yellow or in white.

In medium-resolution graphics mode, thera are only two numbers in a COLOR statement: the *first* sets tha background color and tha second chooses the palette for foreground color. Yes, this specification format is the opposite of the COLOR statement in text mode. Remember, the border color is the sama as the background color, so there is no third number. Assuming a SCREEN 1,0 statement has been executed to put the screen in medium-resolution mode, the following statement selects a blue background and chooses palette 0:

```
COLOR 1, 0
```

Tha currantly activa background color can be retained and the palette number changed by omitting the background color specification:

```
COLOR , 1
```

When the COLOR statement is executed in medium-resolution graphics mode, both background ond foreground colors change immediately and retroactivaly—unlike in text mode, in which foreground color changes are not ratroactive. For axample, if some items were drawn in green, red and yellow using palette 0,

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In medium-resolution graphics, the COLOR statement has no border color specification. The border is always the same color as (and thus is indistinguishable from) the background, which can be any of the 16 colors in Fig. 6. The choice of medium-resolution foreground colors is limited, and the scheme for specifying them differs markedly from the text-mode scheme.

The COLOR statement chooses one of two sets of medium-resolution foreground colors; these sets are referred to by IBM as polettes, and each has four colors. Once the palette is chosen, the statements which actually plot and draw on the medium-resolution graphics screen can choose individual colors from it. To understand the parameters of the palette's use, imagine an artist painting a picture. She has two palettes of paint on her work table, but can only hold a single palette at a time. When she chooses to use one palette, she can only paint with the colors on it. In order to paint with the colors on the other palette, she must put down the one she is holding and pick up the other. The medium-resolution graphics display works in the same way, but with one variation—when a user changes from one palette to another, the colors on the screen change from the colors of the first palette to the colors of the second.

As you might expect, the palettes are numbered zero and one, and the colors on them are numbered from zero to three. Fig. 7 correlates actual colors with palette and color numbers. Notice that on each palette, color numbers 1, 2, and 3 are fixed. Color number 0 is, de focto, fixed, since it is always the same as the current background color. Text printed on a medium-resolution screen appears in palette color number 3, i.e., either in yellow or in white.

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```
COLOR 1, 0
```

The currently active background color can be retained and the palette number changed by omitting the background color specification:

```
COLOR , 1
```

When the COLOR statement is executed in medium-resolution graphics mode, both background ond foreground colors change immediately and retroactively—unlike in text mode, in which foreground color changes are not retroactive. For example, if some items were drawn in green, red and yellow using palette 0,

switching to palette 1 immediately changes them to cyan, magenta, and white, respectively.

Graphics Screen Coordinates

In order to display points, lines, boxes, and so forth, the computer needs to know where they go, which requires that it be given a definite description (unique identifier) of every point on the screen. Imagine that a piece of graph paper is superimposed on the screen and that each box on the grid corresponds to one graphics point. By numbering the rows and columns, any box can be described by giving its coordinotes, that is, its column and row numbers. That is exactly the way points on the graphics screen are identified. Column numbers begin with zero at the left edge of the screen; the rightmost column is 319 in medium-resolution graphics, 639 in high-resolution. In both graphics modes, the top row is zero and the bottom row is 199.

The PSET Statement

Neither the COLOR nor the SCREEN statements alone creates graphics images on the screen, but only condition the screen for the medium- or high-resolution graphics to follow.

The PSET statement plots a single point on the graphics screen at any given coordinates and uses the same format in either graphics mode. The following statement will plot a point at the intersection of column 45 and row 10:

```
PSET (45,10)
```

A color number is optional in the PSET statement. When it is absent in medium-resolution mode, color 3 (yellow or white) is used. If the PSET statement has no color specification in high resolution, it plots a white point.

To specify a color in a PSET statement, add a comma and the color number after the coordinates. In medium-resolution graphics, the color number (0 through 3) chooses one of the four colors from the active palette (see Fig. 6). In high-resolution graphics, an odd color number chooses foreground color (white) and an even color number chooses background color (black). For example:

```
PSET (180,150),1
```

In medium-resolution graphics, the statement above plots a green or a cyan point, depending upon which palette is active. In high-resolution graphics, the statement above plots a white (foreground) point.

The LINE Statement

In addition to plotting points, all versions of PC BASIC have LINE, a powerful statement which draws straight lines as well as empty and solid-color boxes.

Given that any two points define a straight line, it stands to reason that the LINE statement must include the beginning and ending points of a line. The straightforward way to do this is to specify the coordinates of both:

```
LINE (50,150)-(1,10)
```

The statement above draws a straight line from the point at column 50, row 150 to the point at column 1, row 10.

Line color is specified in the same way in the LINE statement as it is in the PSET statement. Following the end-point coordinates, add a comma and the color number. In medium-resolution graphics, the color number chooses one of the colors from the active palette; in high-resolution graphics, an odd number chooses foreground color and an even number chooses background color. If the color specification is absent, as in the example above, color number 3 is used in medium-resolution graphics. If it is absent in high-resolution graphics, the foreground color is used.

```
LINE (50,70)-(70,90),,BF
```

The statement above creates a square the same size and in the same locations as the empty one created earlier. The only difference is that this square is solid red or magenta (depending on which palette is active) in medium resolution. In high resolution, the statement above draws a solid black square, thereby erasing the screen in the area it covers.

Numbers, Variables, and Expressions

In the interest of simplicity, all of our examples have used numeric constants to specify color numbers and coordinates; however, variables and expressions are also allowed. Fractional values are rounded to the nearest whole number. The Average Growth Rate program listed at the end of this article demonstrates the power of variables and expressions in graphics statements.

Relative Coordinates

There are two ways to specify a point. Until now, we have always stated the actual column and row numbers of each point, which is known as the *absolute form* of coordinate specification. The alternative, called the *relative form*, specifies coordinates relative to the last point plotted. When the word STEP precedes the numbers in parentheses, it means those numbers are *offsets* to the coordinates of the last point plotted. Consider these two PSET statements:

```
PSET (40,23)
PSET STEP (10,-3)
```

The first statement above uses absolute form. It plots a point at column 40, row 23. The second statement above uses relative form. It plots a point which is 10 columns to the right and 3 rows up from the previous point plotted, i.e., at column 50, row 20.

You can use either the absolute or relative form to specify the coordinates of any point. Of course, you must use absolute form for the first point you display, since there is no previous point to be relative to.

Now that you have been introduced tc the individual statements of PC BASIC graphics, you can refer to the Average Growth Rate program and see how they work in actual practice.

Average Growth Rate Program

(See page 78)

This program has nine parts: setup, input, computation, verbal output, point graph output, line graph output, bar graph output, conclusion, and headings subroutine. To make it easy to identify and separate the parts, each is shown in a different color.

The first part of the program (lines 10-100) performs various housekeeping chores. First, the program turns off tha bottom-line display of the function key uses (line 10). Next it clears the screen and sets screen width to 40 columns (line 20 and 30). After that, it dimensions a single-precision numaric array (line 40). Here and alsewhere, the program indolently uses single-precision variables where integer variables would suffice. Next, the program displays a titla and instructions (linas 50 through 100).

Lines 200 through 290 input data. The program user must break down the 24-month analysis period into past and future (lines 200 and 210). The total number of past and future months cannot exceed 24 (lina 220). Aftar that, the user must enter a figure for each past month (lines 230 through 290).

Lines 300-490 perform the exponential regression on tha antered data (linas 300 through 390). Next, the program projacts future figures (lines 400 through 420). After that, it computes a scaling factor for the graphic output (lines 330 through 390). To do this, it must find the highest and lowest figures among the past and future figures (lines 400 through 490). Then it divides the graph height, 168, by the sum of the highest and lowest figures (line 490). The result is a scaling factor which will allow all figures to appear on the graph.

Lines 1000-1060 display the exact amount of past and future figures for each month in the analysis.

Lines 1100-1140 use the PSET statement to plot a single point for each past and future figure in the analysis period. Variable C determines the color of the point.

Lines 1200-1250 use the LINE statement to draw a line from one figure to the next. A PSET statement plots the first start point (line 1210). Variable C again determines the color of tha point.

Lines 1300-1340 use LINE statamants to construct solid-color boxes, one for each past and future figura. The width of each box is the same but tha height varies according to the magnitude of the figure. Once more, variable C determines the color of the point.

Lines 1400-1420 pause for the usar to press any key, then reset the screen to text mode and end the program.

Lines 2000-2130 are a subroutina. It first waits for the program user to press any key (line 2000). Then it claars tha screen, sets medium resolution graphics mode, and chooses a black background and foreground palette 0 (lines 2010 through 2030). It sets variable C to specify color 2, red (line 2040). After that, it displays a screen title together with column and row headings (lines 2050 through 2120).

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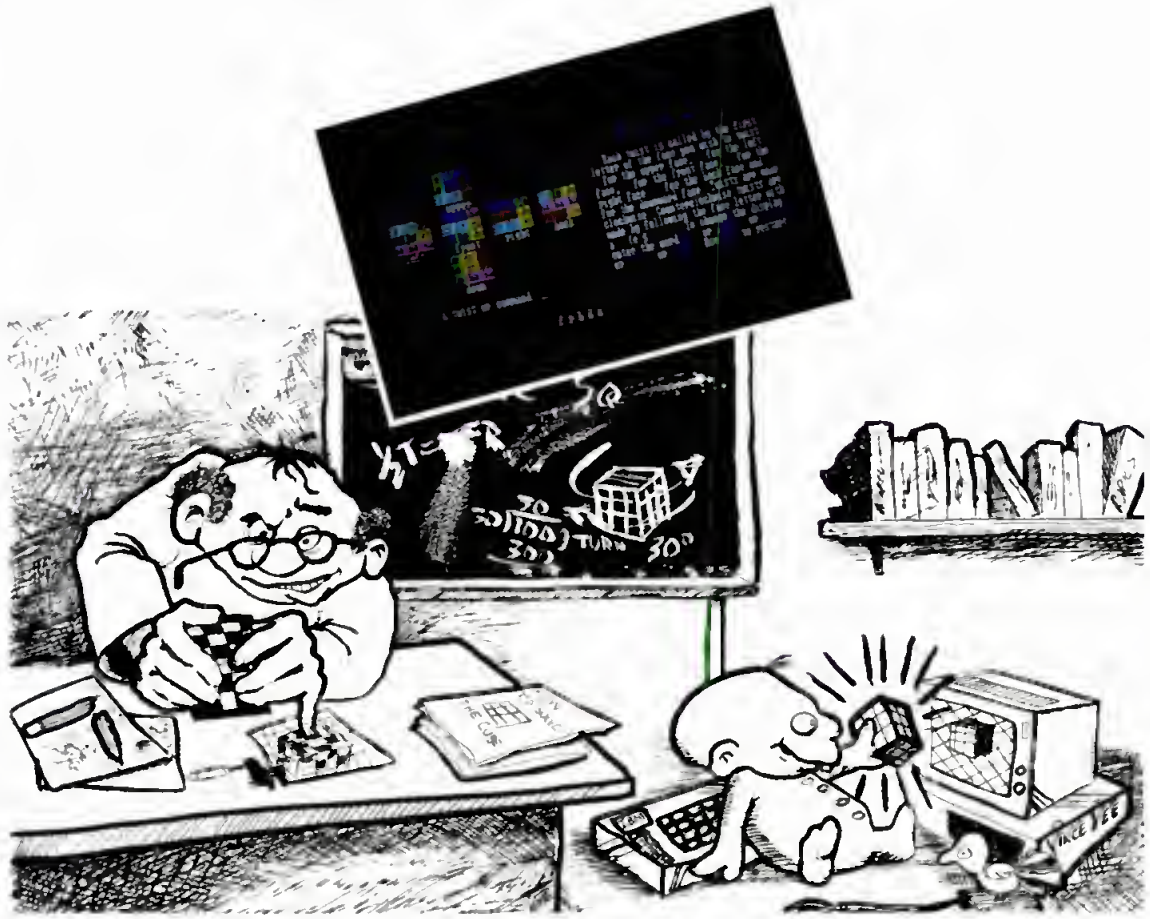
Karl Koessel

MAGIC PCUBE

A simulation of Rubik's Cube on the IBM PC



To try out several features of PC BASIC in an actual program of some complexity, Programming Editor Karl Koessel decided to develop a computer simulation of the popular Rubik's Cube puzzle. The program demonstrates how it is possible to make a 'model' whereby a computer program mimics the behavior of a physical object. The inner workings of the program depend on the MOD arithmetic function that is one of PC BASIC's enhancements. (MOD tells you the value of the remainder after you divide one number by another.) Koessel also designed the program to detect whether a system is set up for color or monochrome display.

For the color-display version, Koessel took advantage of the many color and appearance variations PC BASIC allows. Though perhaps at some cost to its speed, the program also uses the long variable names and formatting abilities PC BASIC permits to improve a program's understandability. It contains no features from the Disk or Advanced versions of BASIC and, with remarks deleted, will run on a PC with 16K of memory. Following is Koessel's description of the program, with some sample displays and excerpts from the program itself. For details on getting a copy of the complete program, see the end of the article.

The 'Magic Cube' has become quite popular since its days as a tool for Ernö Rubik, a teacher of architecture and design at the School for Commercial Artists in Budapest. Rubik used the cube to sharpen his students' ability to visualize three-dimensional objects. (Douglas Hofstrader has an excellent article expounding both the cube's mechanical structure and its mathematical characteristics in the March 1981 *Scientific American*.)

The Magic Cube has six differently colored faces, each with nine 'cubies' in a three by three matrix. Initially, each face is one color, all the cubies on a face the same. But each face may be rotated about its center, moving each cubie of that face (except, of course, the center cubie) to a different position on that same face. Although this face may remain one color after the turn, the rotation will also move the three closest cubies of the four bordering faces, mixing the colors on those faces. After twisting a few faces, the col-

```
1099 '************************    DISPLAY PRINTING ROUTINE    ********************
1100 FOR FA= 1 TO 6
1110 FOR P=0 TO 8
1120     LOCATE X(FA)+XOF(P),Y(FA)+YOF(P)
1130     BR=BR(FIX(CUBIE(FA,P,1)\10))
1140     IF BR THEN COLOR CUBIE(FA,P,2)\8-16,BR:GOTO 1160
1150     IF CUBIE(FA,P,2) THEN COLOR 0,7 ELSE COLOR 7,0          'Highlights ?
1160     IF DM THEN PRINT USING"\\";CUBIE$(FA,P,DM);
         ELSE PRINT USING"##";CUBIE(FA,P,1);          'Print chosen display type
1169 '*****   These lines make for a cleaner display as colors/highlights change
1170     IF P=1 OR P=2 THEN ND=1:GOSUB 1240
1180     IF P=8 OR P=0 THEN ND=4:GOSUB 1240
1190     IF P=7 OR P=6 THEN ND=-1:GOSUB 1240
1200 NEXT
1210 NEXT
1220 COLOR 7,0                                  'Normalise foreground, background
1230 RETURN
1239 ' Find proper colors for each side of space between cubies
1240     IF BR THEN COLOR BR,BR(FIX(CUBIE(FA,(P+ND) MOD 12,1)\10)) ELSE 1260
1250     PRINT CHR$(221);:GOTO 1280
1260     IF CUBIE(FA,P,2)=CUBIE(FA,(P+ND) MOD 12,2) THEN 1270 ELSE COLOR 7,0
1270     PRINT " ";
1280 RETURN
1299 '************************    CLEAR PROMPT/INPUT LINES    ********************
1300 LOCATE 14,1:PRINT "One moment, please...";SPC(79);SPC(39);SPC(39)
1310 RETURN              'Clears lines 14 & 15; also 16 WIDTH 40 clears line 16
1399 '************************    TURN OFF HIGHLIGHT FLAGS    ********************
1400 FOR J=1 TO 4
1410     FOR K=1 TO 3
1420         CUBIE(FACE(J),((POSITION(J)+K-2) MOD 8)+1,2)=0
1430     NEXT
1440 NEXT
1450 FOR P=1 TO 8
1460     CUBIE(F,P,2)=0
1470 NEXT
1480 RETURN
```

This program section displays the newly changed cube diagram on the screen after a twist.

```
1799 '************************    PREPARE TO TURN OUTER CIRCLE    ****************
1800 FOR J=1 TO 4
1810     FOR K=1 TO 3
1820         'Set cubie values in holding cells
1830         HOLD((J-1)*3+K)=CUBIE(FACE(J),((POSITION(J)+K-2) MOD 8)+1,1
1840         'Turn on highlight flags
1850         CUBIE(FACE(J),((POSITION(J)+K-2) MOD 8)+1,2)= 1
1860     NEXT
1870 NEXT
1880 RETURN
1899 '************************    FINISH TURNING OUTER CIRCLE    ****************
1900 FOR J=1 TO 4
1910     FOR K=1 TO 3
1920         CUBIE(FACE(((J+OSO) MOD 4)+1),((POSITION( (J+OSO) MOD 4)+1)+K-2)
             MOD 8)+1,1)=HOLD((J-1)*3+K)              'New value of each cubie
1930         FOR DM=1 TO 2                            'Associated names follow
1940             CUBIE$(FACE( (J+OSO) MOD 4)+1),((POSITION( (J+OSO) MOD 4)+1)
                 +K-2) MOD 8)+1,DM)=PLACE$(DM,FIX((HOLD((J-1)*3+K)\10) )
1950         NEXT
1960     NEXT
1970 NEXT
1980 RETURN
```

This section of the program keeps track of the bordering faces of the cube to be changed when a twist is ordered.

ors become quite scrambled. Note that no matter which face is twisted, the center cubie of each face maintains its orientation to the other center cubies and, assuming we do not turn the entire cube but only the faces, each center cubie never changes its position.

The challenge of the Magic Cube is to reorder the scrambled colors to their original segregated state. This is very difficult. But, by keeping track of the twists performed, we may learn 'sequences' that swap the colors of certain cubies while leaving the other cubies undisturbed after the sequence is completed.

In "Notes on Rubik's 'Magic Cube'" by David Singmaster, the faces have been given names. Because any two cubes may have different colors, or colors that are arranged differently, the faces are named not by color but by place. From Singmaster's convention, the faces are called 'upper', 'left', 'front', 'right', 'back' and 'down'. A 90-degree rotation of a face is called a 'twist'. Clockwise twists are named by the single letters 'U', 'L', 'F','R', 'B' and 'D' respectively, designating the face twisted. Counterclockwise twists

have the same notation plus a prime (the single close quote) following, as in 'L'.

The program begins by asking you to give each face an arbitrary color (on the monochrome display, simply the name of a color). It then prints brief instructions, displays the Magic Cube unfolded on the screen as six faces of nine cubies each and asks for a twist or command.

Below each face is its name. These names may be erased (or, if off, reprinted) by entering the command 'LABELS'.

Each cubie is represented by two consecutive characters. Initially, they are the first two letters of the names of the faces, but they may be replaced by code numbers (used by the program) or by the first two letters of the names of the colors you gave each face. To change to these different types of display, enter the command 'CODES', 'COLORS' or 'FACES'.

For those with a color display, the cubies have assigned background colors. And an additional command, 'BIG', changes the size of the display from small characters to large or vice versa. The instructions fit only in the WIDTH 80 display mode.

To twist a face clockwise, enter a single letter naming the twist, such as 'R'. To twist a face counterclockwise, the single letter name must be followed immediately by the prime 'R'. The program then highlights the cubies that will be changing positions by printing them in reverse characters (black on white) on a monochrome display or by blinking them on a color display. A second question asks if it is okay to proceed before performing the twist by updating the display. Then a list of the twists made so far is printed on the lower portion of the screen, and the program returns to ask for another twist or command.

"The challenge of the Magic Cube is to reorder the scrambled colors to their original state."

The program will also respond to one other command. When you enter 'NEW', the program restores the cube to the starting configuration and erases the twists.

One last note for programmers and mathematicians: because of the circular nature of the twists and of the cubies around each face, the program makes ample use of a new BASIC function found on the IBM Personal Computer. This function performs modulo arithmetic (also known as 'clock math'). See the IBM BASIC manual, pages 3-21.

For a copy of the Magic PCube program . . .

The complete program for Karl Koessel's simulation of the Rubik's Cube is several hundred lines long—too long to print here in its entirety. PC will make copies available in either printed or disk form to readers who want them. Mail requests to *Cube Progrom, PC, 1528 Irving Street, Son Froncisco, CA 94122.* For printed copies, send $3 with a self-addressed, business-size envelope. For disk copies, send $10 with a blank, PC-formatted disk in a suitable mailer with a self-addressed return label. Make checks payable to Karl Koessel.

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A Tale of Two Beginnings

Charlie Hoerner, corporate pioneer and Gary Moonert, private entrepreneur.

Charlie Hoerner and Gary Moonert are helping to spread the word and the applications of the PC, even though neither man works for IBM. In fact, these two advocates of microcomputers are working in different areas of society: Gary's principal interest is in helping bring this technology to new individual users, while Charlie is concentrating on uses for the computer within a large corporation. Both are at the beginning of a promising new venture, and the PC is a central figure in their stories.

Charlie Hoerner

Charlie Hoerner of Foremost McKesson

Hoerner works in the Information Services department of Foremost-McKesson, the largest drug wholesale distributor in the United States. Several years ago, the corporation significantly improved its operations and earnings by computerizing many basic operations (*Business Week*, December 7, 1981). Since making the step into large-scale computing, the corporation has begun a program of utilizing small computers both as part of its office automation program and as management tools.

That's where Charlie Hoerner comes in. The coordinator of corporate activities in office automation, he has also assumed the task of introducing, evaluating and developing uses for the five IBM Personal Computers that Foremost-McKesson has purchased. Hoerner points out that these pilot machines are expected to be the first of a series to be purchased by the company: "We're estimating that there's a good likelihood of another 15 to 20 machines going in throughout the corporation within the next six to twelve months," he says.

Economy is a major consideration in the corporation's anticipated purchase of 20 or more of these desktop computers. As Hoerner notes, "We don't know what all of the applications are going to be. One thing we do anticipate, however, is that they're going to expose people to some of the potentials of computing in a way that previously wasn't economically possible."

VisiCalc is Key

At present, the main application of the PC at Foremost-McKesson is financial analysis and calculations—and the reason for the PC's immediate utility in these areas is the *VisiCalc* program.

One of the firm's PCs is in the Treasury department, where financial projections and analyses must be based on formulas or assumptions that can change rapidly. Hoerner believes that the greatest number of requests for more PCs will come from areas of the corporation involved in financial planning, specifically, from *VisiCalc* users. "The greatest interest that we've seen comes from people who have to do a lot of financial analysis, people who are dealing with a lot of change and want to be able to evaluate all the alternatives. You can't write a program using conventional programming languages, with a programmer sitting there, and have it change back and forth and be that flexible."

Another of the five microcomputers is used by the planning and analysis group within the corporation, and the remaining three PCs are presently being used by Hoerner and two other members of the Information Services department. A sixth PC will be added in a New York office of the company and will utilize communications hardware and software to exchange financial data with the San Francisco headquarters. One initial use of this coast-to-coast hook-up will be to monitor foreign currency rates, which change frequently and thus can affect the firm's day-to-day operations.

Would you or someone you know be a good subject for a ***PC Profile?*** *PC welcomes suggestions for people to be featured in this series—anyone whose use of an IBM Personal Computer would prove interesting or helpful to readers. Send your recommendations to PC Profiles, 1528 Irving Street, San Francisco, California 94122.*

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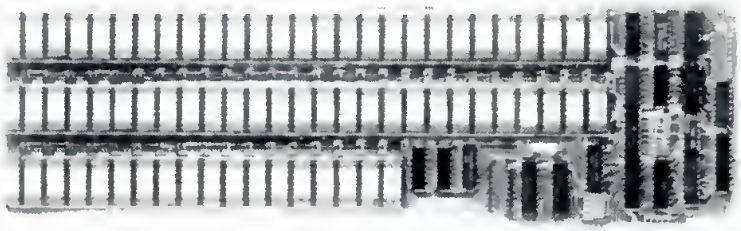

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All five people evaluating the uses of he machine at corporate headquarters ıave some experience with computers; he three Information Services staff nembers have data processing back-grounds, and the two treasury and plan-ıing people have personal computers at ıome, although neither has a PC. So, to late, the PC users at Foremost-McKesson ıre not novices.

Hands-on Learning

That situation is changing quickly, ıowever, according to Hoerner. He has pent several weeks giving demonstra-ions of the PC to interested departments, nd his standard technique has been to et an inexperienced volunteer actually perate the computer as that person's co-vorkers look on. "It lets the person using he machine know there's nothing magi-al going on at the keyboard," he reports. It's hard to keep an eye on the screen nd see what keys are being pushed at he same time. And for the people watch-ng, they know that person doesn't know ny more about it than they do—so that akes away the mystery."

When presenting this unfamiliar tech-ology to a group, Hoerner lets the com-puter do most of the work. "I've set up the lemonstrations to be very straightfor-vard, such as using the auto-execute unction so that all you have to do is load n the diskette and turn your back on it. And while I'm talking, they hear all this peeping and clicking going on, and all of sudden, a menu comes up on the creen. That's very clear-cut—you don't ıave to worry about it at all. People enjoy hat."

In addition to the financial planning ctivities presently employing the IBM Personal Computer, word processing is nother area of strong interest within the ompany, according to Hoerner. At pres-nt, however, he is not able to place a sys-em in a department for that purpose, be-ause he has not found satisfactory oftware. "We're looking forward to VordStor," he states. "We tried Easy-Vriter [the word processor sold with the ystem by IBM and the only one presently vailable] and we decided it was just $175 lown the drain. It just wasn't useful nough."

Even when more versatile word pro-essing software is available, Hoerner loes not expect the PC to replace the mall number of dedicated word proces-ors presently in use by the corporation. "I don't see the PC replacing word processing in high-volume work, since I find it hard to imagine that something that's a general-purpose computer using 'over-the-counter' software is going to replace something that was custom-designed from the ground up to serve a secretarial function."

Hoerner points out that one primary advantage of a dedicated system is its ease of learning and use. "If somebody has to remember that F16 means this in one application, and that in another, the system is just not as easy to operate as a dedicated word processor, which has clearly labeled function keys that say 'Find' or 'Go To' and that serve a particular function. So it's worth paying the extra money for a dedicated word processor in those situations."

"With the right applications, I can envision an excellent tool for managers."

A Management Tool

However, if clerical functions are not, at present, a likely application of the PC, managerial functions are. "The purchase price, to my mind, is reasonable enough that, with some discounting and with the right applications, I can envision a system that's an excellent tool for managers. It must have the software, though, including a good word processor that's simple; it doesn't need a lot of fancy features, but it must be easy to use. Such a system must also have versatile communications capabilities that allow a manager to use time-sharing networks, to upload and download files, to bring in files, and to pass things to VisiCalc and to other computers."

Before this potential can be realized within the company, Hoerner believes that further development and evaluation will be necessary. "I see the potential for the PC as a desktop computer for managers, but I think the corporation is going to have to take that on as a project and make that happen and then hand it over to the manager as a finished product—not just give him a bunch of boxes and say, 'Here, have a good time.' Not only doesn't the manager have the time to do it, but you're reinventing the wheel at every place."

"Reinventing the wheel" may also be an apt description for setting up the PCs when a bulk order is received, Hoerner recalls. "When you make a multiple order from the company, not from a store, you get one big box for each component, and then you get a box of spare parts. Each little part has a number on it, and there are instruction manuals for putting them together."

Setting Up Is Hard To Do

Considering that the basic computer comes with 48K of memory, and most business users routinely order the 16K expansion kit to have 64K of memory, installing the spare parts isn't a mere matter of slipping a board into a ready slot. "When you do the memory expansion," he says, "you've got to put in these nine integrated circuits. All the IC's have legs that are a little bit flared, and all the sockets are lined up directly below, so the odds of somebody who's never seen a machine like this getting them all in without bending a pin or breaking it off are relatively small. You have to roll the thing and get the pins so they're straight up and down and then guide the IC into the holes.

Except for these problems with setting up the PC, Hoerner has been well satisfied with the computer. "I'm very impressed with the reliability of it and I haven't had any trouble," he states.

Hoerner recognizes the necessity for a trade-off between maintaining low prices for multiple orders of the system and the customer's responsibility for assembly. In fact, he predicts that increased user involvement is a trend in this business. "I recognize the way the industry's going, and this is one of the things that's going to be new. Providing installation, on-site training, and field support for everything that goes wrong has become an intolerable expense for companies making hardware with prices this low—especially hardware that's sold, not rented. So the upshot is, if you're going to get that price on something, you're going to have to put up with the inconvenience and learn to do it yourself."

Hoerner is confident that he and his associates can weather the initial storms of installation and fashion a useful and reliable system around the PC. However,

(Continued on page 95)

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Gary Moonert

at present, he is less certain about the software. He has written several programs in BASIC to help him demonstrate and evaluate the machine, and he has modified the minimal communications program that is part of the PC's DOS. But he is not impressed with the separate communications software distributed by IBM, and this capability is essential if the PC is to be widely used within Foremost-McKesson.

"The communications software is pretty primitive right now," he observes. The major disadvantage, according to Hoerner, is that the IBM communications software does not make it easy to "upload and download" data between your personal computer and the remotely located host computer. "You can exchange with another PC or you can function as a certain terminal for a host system—but not both. I was very surprised that they released the software this way."

Like many other PC users, however, he is anticipating that many software developers will step in to fill the void. "As far as the software goes," he predicts, "you can only hope. I'm guessing that the PC market's going to be big enough that we're going to see tons and tons of software coming down the chute within the next year."

Because he believes that the IBM PC will find a valuable place within Foremost-McKesson, Hoerner has begun to develop the integrated system of hardware and software that staff members will need. "I've already started sketching some ideas for design considerations, and I'll be hiring someone soon. One of the criteria for the job is that they know BASIC. We'll be writing some experimental software to go with what we presently have for the computer."

Hoerner has one other long-range hope for this personal microcomputer and his work. "There's one more area that I'm kind of dreaming about," he confides. "I don't know how soon it's going to come, but it seems inevitable. And that has to do with the interface between home and office. If people have equipment at home that's compatible with what they have at the office, all of a sudden it expands their capabilities and flexibility. Although it has an inherent risk, in that people might be tempted to work 24 hours a day, the potential rewards include the ability to do some work at home and thus to avoid some of the commuting hassle. Given rising energy costs, it's about time we started looking for alternatives along this line."

Gary Moonert, Technology Consultant

Gary Moonert is another seeker of alternatives, and his plans center around the home-work strategy that is Charlie Hoerner's dream. Specifically, Gary is forming a company to advise individuals about technology on a personal level. "What I really want to get down to doing," he notes, "is being the technology assessment expert for the average person. They might come to me and say, 'I think I want a computer,' and I'll listen to them and ask questions and offer alternatives at different prices and with different features."

Although he has worked as a data processing professional for 15 years and currently is employed by a major California bank, Moonert's new career focuses on individuals. "My specific interest is in advising the individual," he states. "The corporations have people to give this assistance, and if they don't, they have IBM to tell them. But the public doesn't have this kind of help."

As the first step in educating himself in personal computers, Moonert bought a PC from one of the ComputerLand stores. His system includes the computer with 64K of memory, the companion dot-matrix printer, the mono display, and the color graphics component so that he can use his color television as a monitor as well. He also purchased two disk drives, the DOS system, and *EasyWriter*.

Like Hoerner, Moonert had the specific intention of evaluting the PC for its strengths, weaknesses, and applications for general use. The difference is that he'd like to see computers in the hands of housewives, kids, and anyone else who doesn't come into contact with this technology on a regular basis. His perspective is that these machines, together with the other electronic marvels available today, are truly tools for all of us.

Technology as Friend

"I use the term 'technology' in the most magnanimous of spirits," Moonert points out. "When I say that word, I'm removing it from the arena of mainframe computers; I'm talking about a whole world that is ultimately there to serve everybody."

Nor is his focus limited to computers: "It's not just computers' it's what I consider to be technology as it's going to relate to everybody: television as components, such as a color TV that is also a monitor for the computer; the telephone that links you to many things; stereo that could work with the television components. All these things can be part of a system that is planned for each person according to his needs, taste, and budget."

These interests have been part of Moonert's thinking for a long time, and his present job involves improving the relationships between computer professionals and people in the bank who utilize their services. Now he hopes to take his services "beyond the walls of the corporation," as he puts it, and IBM's introduction of the Personal Computer told him that the time had come to launch his new career.

"If people have equipment at home that's compatible with what they have at the office, all of a sudden it expands their capabilities."

"Actually, as a career for me, this was something I looked at and didn't take seriously as being do-able until IBM sort of sanctified personal computing by making this machine. Now I've bought the computer, taken it home, played with it,

opened the cover, looked inside and said, 'This is a personal computer. Never mind that the marketing emphasis isn't on individual home computing use right now. It's there. It's capable of doing recipe archiving, music, and other things that business users aren't going to do with it, by and large.' "

Priority Number 2

Moonert believes that despite the PC's obvious utility as a versatile home computer, IBM has not yet included the individual user in its marketing efforts. "It appears to me that IBM's marketing and literature is directed toward the small-business user whose computer needs are similar to those of the company's traditional customer base. I don't yet see the thrust from IBM to place the Personal Computer in the homes of the public. I think that will come, but it's priority number two for IBM. I think they're very cagey, in a marketing sense; they have an immediate marketplace that they can center their attention on—the corporations, banks, and so forth. They can sell a hundred or five hundred to these places. When they feel that they've more or less saturated that market segment, they'll get more serious about the system's ultimate marketplace, which is the personal computer user. In other words, I think this machine was accurately—and strategically—named for a purpose the IBM is some time away from."

Though his purpose in assessing the PC is different from the business thrust he sees dominating IBM's present marketing strategy, Moonert has some of the same reservations about the system as Charlie Hoerner. The biggest problem for both men in trying to evaluate the potential of this system is the lack of applications software.

"My perspective on behalf of my ultimate client is that I could see a lot of reasons for a more integrated approach to the whole system," he states. "It's a large disappointment to me that you can't easily transfer files between *EosyWriter* and DOS—they are independent systems. I can't imagine why in the world they constructed it that way."

Software Solutions

Although Moonert's data processing experience includes programming, and he has written some programs for his own use on the PC, he does not plan to join the ranks of software developers. "I look around at the record of other personal computer implementations and users," he observes, "and there's obviously been a large amount of bright, generally young talent that has seized the TRS-80, the Apple, and the Atari. Those people are a talent base who are dying to do what needs to be done for the PC, and I am waiting for them to do it. Programming is not my primary area of interest, and it's not where I feel my talents, and therefore my contributions, ultimately lie."

Instead, Moonert is content to wait until the software and integrated system comes of age for the PC, and he believes that that won't be long. "The IBM PC industry is in its infancy, and I don't have to make my living at this new career yet. I'm willing and able to wait until the industry is right for me to do what I want to do. It's only a matter of time. I have the feeling that it's not years, but months, or in some cases, even weeks. The kids down at ComputerLand playing on the machines are one layer of it, but more importantly, it's the hobbyists—or latent hobbyists—inside corporations like IBM who are the brightest minds going and who have been waiting for something like this to roll around. They will come up with things for the PC that are mind-boggling."

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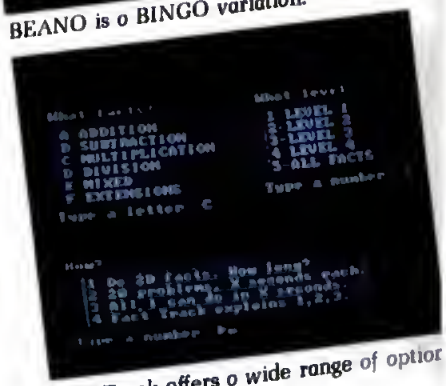

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by Science Research Associates, Inc.
IBM Product Center Price: $90

These three titles are among the first educational programs to be released for the IBM Personal Computer. Because they were introduced so soon after the computer itself, they were expected to be somewhat rudimentary, and indeed they are. In spite of this, they were thoughtfully developed and do have real educational value; best of all, children will love them, though maybe not as much as they love some of the current video games. The truth is that, overall, these releases, developed at an IBM subsidiary called Science Research Associates, Inc., have a great deal of redeeming value.

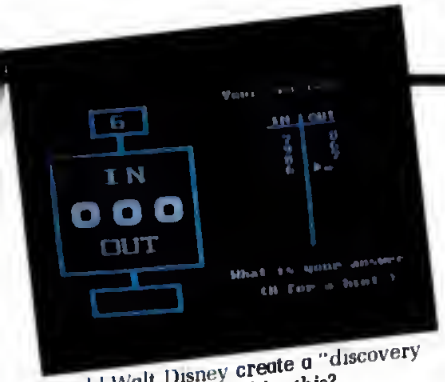
Fact Track

I liked Fact Track from the first moment I used it. The program presents itself well, both academically and aesthetically; it uses color graphics and sound to interest users at the beginning, and then easily understandable directions to ensure that they will stay and learn.

Fact Track teaches 390 arithmetic facts, involving addition, subtraction, multiplication, and division. The brief and well-organized instruction booklet gives a description of these basic func-

Cassidy Warner and her mom, Katie, have a great time playing BEANO.

*Prices at other outlets may vary.



Would Walt Disney create a "discovery machine" that looks like this?

tions, but you can also work with mixed numbers or extensions of these that require seven additional skills. These skills include multiplying and dividing by ten, adding three single-digit numbers, and adding one-digit numbers to two-digit numbers without renaming (adding from right to left). In addition, if you choose one of the four basic skills, you have the option of working at sub-skill levels one to four.

And still this is only the beginning.

The three packages are "Arithmetic Games Set 1," "Arithmetic Games Set 2," and "Fact Track." Each package consists of a floppy disk, instruction booklet, and warranty card packaged in a handy brown vinyl binder. Each one requires an IBM PC with 64K bytes of memory, and a color/graphics monitor adapter with a television set or color monitor. Once you've narrowed down the topic of the lesson, its length and method of presentation are the next user options.

The time option is particularly delightful, as it consists of a simple yet eye-pleasing graphic sliding scale. By pressing the arrows instead of entering digits, you choose from 20 seconds (displayed on the left) to 200 seconds (lights up on the right).

After selecting a time limit and the number of problems you think you can solve, the program asks you if you want to race against the computer. I always found myself in a racing frame of mind as I went through the program, and I doubted that anyone would not want to race.

However, when I asked Cassidy Warner, age 9, to try out the math games, I discovered that she was initially too timid to challenge the computer to a race. Only after she gained confidence in her ability to master the games did she wish to race the computer.

Cassidy's test of Fact Track pointed out its major weakness, which is that the program is too limited. While Cassidy loved the way the game worked and found it very exciting, she is already very competent in the skills it teaches. Thus, Fact Track really offers her little more than amusement. This conclusion is probably applicable to many situations.

BEANO

On the other hand, BEANO, which is part of "Arithmetic Games Set 1," was a different matter. BEANO is a variation of BINGO that is played on a card (depicted on the screen) containing a grid of numbers. In the least difficult of three levels of play there are seven "Free" spots on the player's card and the numbers are all under 20.

A graphic version of a pair of dice spins underneath the card, then settles to show two random numbers. The idea is to use these numbers by adding, subtracting, multiplying, or dividing them so that the result will be equal to a number on the card.

I tried the most difficult version against the computer and after a false start found it to be a very challenging exercise. In this version there is only one free spot and the dice roll three numbers. On my first attempt I discovered that the game does not calculate left to right; instead it first multiplies and divides from left to right and then adds and subtracts.

The number I wanted to arrive at was 35, and my dice had rolled 8, 1 and 5. Thus, I entered "8−1×5." To my dismay I discovered that the answer to this problem was "3" according to the way BEANO calculates. My solution to this dilemma (since I did not wish to alter my own calculation logic) was to simply put parentheses around every problem, such as (8−1)×5.

BEANO was challenging and fun. Cassidy and her mom played the game for about an hour while we took their pictures. They are both ready to come back and I think BEANO is a hit. However, BEANO's companion program, "Rockets," is another story altogether.

Rockets

Arithmetic Games Set 1 has one good program, "BEANO," and one dud, "Rockets." It reminds me of 45 rpm records I used to buy when I was a kid, with a hit single on one side and vile scratchy sound on the other. However, Arithmetic Games Set 2 is different. It contains two equally mediocre games called "Discovery Machine" and "Number Chase."

Discovery Machine

In Discovery Machine a number goes into a machine pictured on the screen. Some mathematical event happens and it comes out of the machine transferred into a new number. The trick is to discover what the machine is doing to the number.

Not a bad idea, and it has educational value, but it is hard to forgive SRA for such poor, elementary graphics. Come on, folks, this is a DISCOVERY MACHINE, how come it can't look exciting?

Number Chase

Number Chase is also an interesting idea. You try to guess the computer's secret number before the computer guesses your number.

Like Discovery Machine, its graphics are nothing to cheer about, and I honestly wonder what value for your money these two programs give you. In my opinion, they should be sold for under $10. I have a few other opinions I'd like to share with you, so I'm going to get up on my software soap box long enough to air out some minor irritants.

Impressions from the Software Soap Box

Minor Irritant #1. As with other IBM PC programs, the first time you use the SRA arithmetic game packages you have to perform the relatively fool-proof, yet definitely computerese, procedure of loading DOS from the DOS disk into the machine and then copying it onto the program disk. I really find this to be an annoyance. It runs contrary to my notion that operating systems should be totally invisible to the vast majority of users. If DOS has to be on the disk to make it work, then it should be loaded by the manufacturer.

Minor Irritant #2. The dreaded NUM LOCK key. [When this key on the PC keyboard is depressed, the key pad functions as a number pad.] When it isn't, the keys do other things. This is a problem because there is no indication of which mode the NUM LOCK key is in at any particular time.

Programs such as these, which require mostly number keystrokes, should give you NUM LOCK *feedback*. What this means is that there should be some indication on the screen of whether or not you are in NUM LOCK.

Minor Irritant #3. The dreaded SHIFT LOCK key. This is not particularly important to the programs reviewed here, but nonetheless it has the same problem.

Minor Irritant #4. These programs, like many other "educational" programs, accept homogenized public school standards as their goals for student performance. Personal computers have the potential to accelerate the learning curve in exponential leaps. If you understand this potential, you probably realize that if we can learn more, then indeed we can actually raise our standards.

Minor Irritant #5. Few educational programs seem to have been designed with an understanding of the realities of the classroom environment. In particular, the relationship between student and teacher is often overlooked or misunderstood.

For example, while the SRA programs can be run with or without sound, which may be useful in a busy classroom, the option is entirely student selectable. Neither teacher nor computer can control the situation unless the student cooperates. In some classrooms they will and in others they won't, but in both cases they require teacher attention that could best be used elsewhere.

All in all, not a very inspiring beginning for educational software on the IBM Personal Computer. I certainly hope to see much improved releases in the future.

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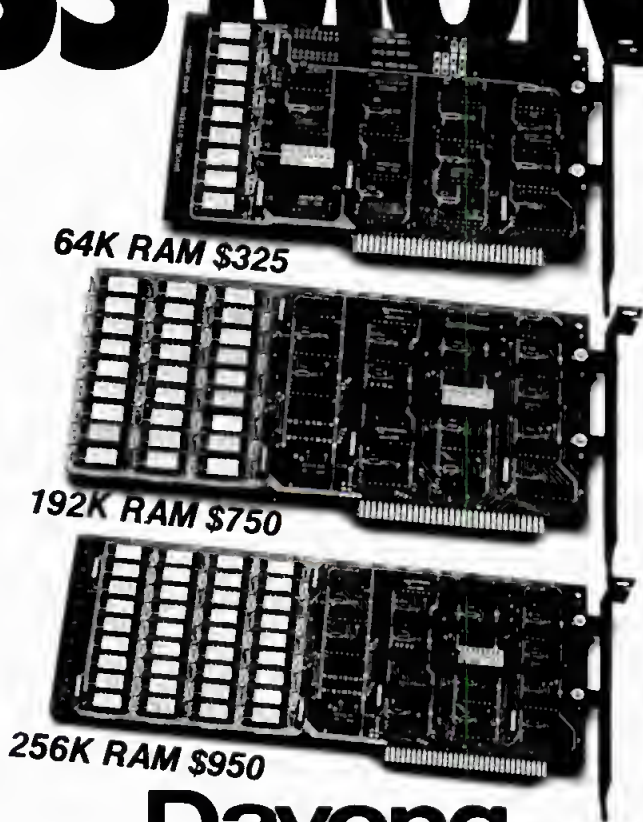

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Letter Writing With *EasyWriter*

The PC's *EasyWriter* word processing program includes the ability to display as many as three headings or footlines anywhere on a page, a very useful feature unmatched by even the mighty *WordStar*, which only provides for two such headings. One way to use these three headings is to insert date, addressee, and page number references at the top of each sheet of a multi-page letter, following a standard business letter format. Further, this feature can be made to operate automatically, eliminating the need for the writer to monitor page breaks.

The following routines accomplish this letter-writing task very reliably and, at the same time, provide a good method for organizing address and correspondence files neatly within the *EasyWriter* file system. Working through the following routines will also give the user a hands-on tutorial covering virtually all of the *EasyWriter* embedded commands.

Formatting the Envelope

The first file to create is a print formatter that will print both an address and a return address in the proper positions on a standard business envelope. Begin by loading the *EasyWriter* program and then load a blank storage diskette formatted with IBM DOS and initialized with the *EasyWriter* overlay. From the File System menu, type C Y to clear memory and enter the Edit mode. Then, type everything shown in Fig. 1, character for character. This file will be explained later, but for the present, save it as File #1 by pressing key F10 (return to the file system) and typing S (save) "ENVELOPE" (name of file).

(Note: the ¶ symbols in the figures indicate carriage returns, made by hitting ENTER at the keyboard and displayed on the screen as eighth-note symbols.)

The first entry in the file, .formstop, like all the embedded commands, begins with a period and must be terminated with a carriage return. It instructs the printer to pause between pages and is used whenever the printer does not contain continuous-form paper.

```
.formstop¶
.space0¶
.titlea¶
.titleb¶
.titlec¶
.page¶
.top0¶
.margin0¶
Your name¶
Your address¶
Your city, state and zip¶
¶
¶
¶
.margin52¶
```

Fig. 1—Envelope formatter

```
.formstop¶
.space0¶
.titlea¶
.titleb¶
.titlec¶
.page¶
.top4¶
.margin10¶
.pagelines66¶
.lines50¶
Your address¶
Your city, state, zip¶
Today's date¶
.titlea,1,Today's date¶
.titlec,3,page¶
.page3,6¶
```

Fig. 2—Letter formatter

```
Jim Edlin, Editor¶
PC MAGAZINE¶
1239 21st Avenue¶
San Francisco, CA 94122¶
.titleb,2,Jim Edlin¶
```

Fig. 3—Sample address file

```
Dear Jim:¶
¶
First, congratulations on the first issue of PC MAGAZINE.  It looks
terrific, and already has served up more information about the IBM-PC
...
...
way for someone to play with the Embedded Commands.  Actually, I
prepared the first draft of this to instruct people working on my
own machine, and hope others might find it helpful.¶
¶
Thanks for a great magazine.¶
¶
¶
Best,¶
¶
¶
Andrew Fluegelman¶
```

Fig. 4—Sample letter file

A .space0 instruction embeds single spacing by telling the printer to insert zero spaces between lines. Remember to start with a period and to be sure that the zero immediately follows the word "space."

The next four embedded commands, .titlea, .titleb, .titlec, and .page, are what I call clearing commands since they eliminate any heading and pagination instructions which may have previously been put into effect, ensuring that no

headings or page numbers will appear on the envelope.

The command .top0 instructs the printer to insert no (zero) blank lines before commencing printing, and operates under the assumption that the envelope will be positioned with the printer's head at the top of tha printable area. .margin0 sets the left margin at the begin-printing-here position.

The next three entries contain a return address, which should be entered as indicated. If an address is already printed on the envelope, omit the .margin0 command and enter three blank lines (which are necessary to keep the vertical spacing correct) by pressing the ENTER key thrae times.

The three carriage returns shown in Fig. 1 move the print head down to the proper position to begin printing the addressee's address. The .margin52 command sets the left margin approximately 4½ inches from the left edge of the envelope. The envelope formatter file ends here; later it will be linked to separate address files.

Formatting the Letter

The next file to establish is a letter formatter. From the File System menu, type C Y, then entar tha contents of Fig. 2.

Name and save this as File #2 by pressing key F 1 and typing S - LETTER.

The first six embedded commands on this file are clearing commands, as in the ENVELOPE file. The next two commands instruct the printer to position the print head four lines from the top and to set the left margin ten spaces in.

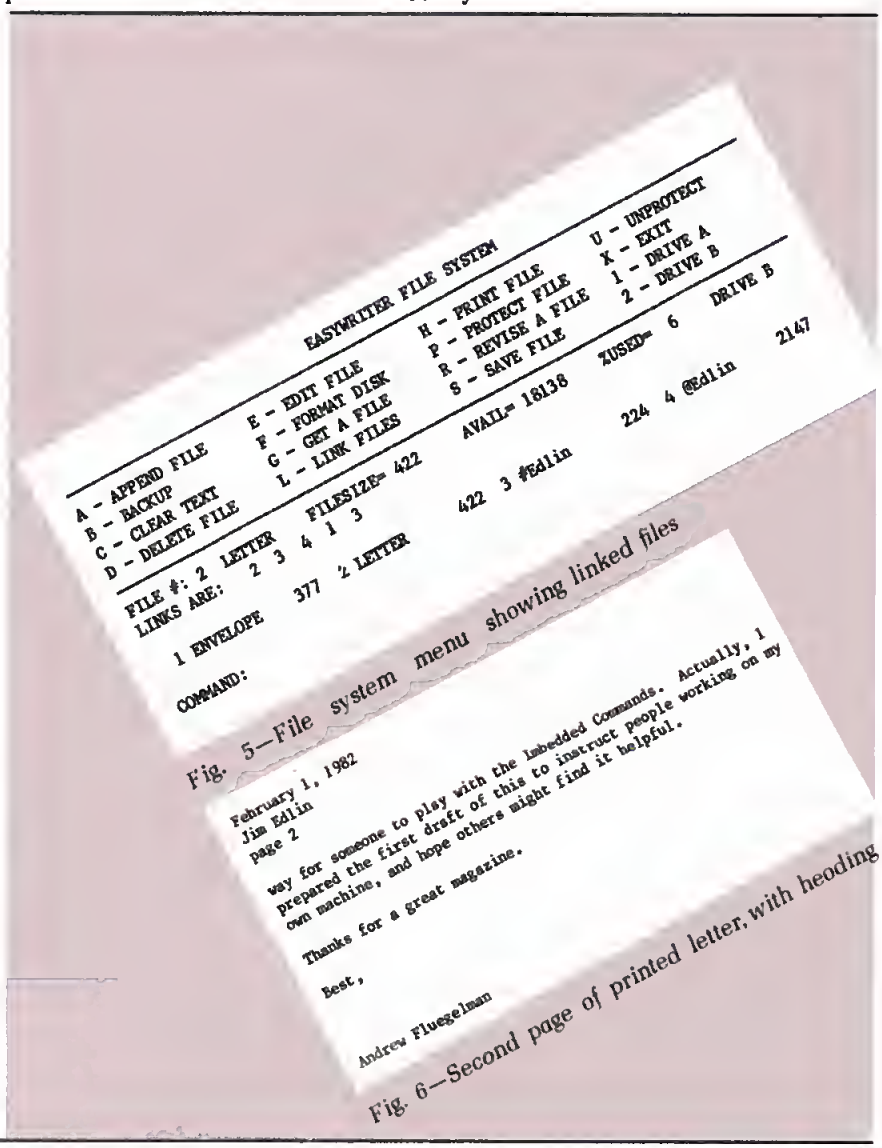
The .pagelines66 command tells the printer know that each page is 66 lines in length—the standard for printing six lines to an inch on 11-inch paper—and is the default for the *EasyWriter* program. It's inserted here as another clearing command in the event that another value may be in effect.

The .lines50 command specifies how many lines will be printed on each page. To determine the number of lines in the bottom margin, subtract the .top and .lines values from the value of the .pagelines command.

The next two lines contain your address, which will be printed at the top of each letter; if you're using printed letterhead, substitute carriaga returns. Tha following line contains the currant date.

The final three commands instruct the printer to print a heading on all subsequent pages of the letter. The .titlea,1, portion of the first of these commands directs the printer to print heading a on the first line of the second page. Tha today's date portion of that command contains the text that will actually be printed on line one.

The .titlec,3,page command directs the printer to print the word "page" on the third line of the second page; if it had read .titlec,3,sheet, it would have printed the word "sheet". Be sure to follow the spacing and punctuation exactly.



The last command on this file, .page3,6, tells the printer to number each page and to position that number at line 3, column 6. This works in conjunction with the previous command so that the third line will print as "page 2".

One final note: These last three commands are placed below the address and date text so that the heading does not print on the first page of the letter. The program accomplishes this by clearing the heading and page numbering for the first page and inserting the heading commands so that they'll take effect when the printer reaches page two.

Creating an Address File

To write a letter, begin by creating two files—one for the address and one for the text. From the File System menu, type C Y, then create your address file, which should look like Fig. 3. Remember that the ¶ symbol indicates carriage returns.

Save this as File #3 by pressing key F10 and typing S - #Edlin.

The first three lines of this file are a normal address. The fourth line contains another embedded command, which completes the heading to appear on page two of the letter and instructs the printer to print "Jim Edlin" on line two of the page.

The address file should contain this embedded command even if the letter is certain to be less than a page long, since you may want to use this file later on for another letter. The insertion of this command is also necessary to ensure the correct spacing of the first page of the letter.

Creating a Letter

To write the letter itself, clear the editor by typing C Y from the File System menu. Start the letter with the salutation, as in Fig. 4. Try to make sure that it's long enough so that you'll be able to see the second-page heading feature operate when you print the letter.

Remember to end the letter with the embedded command .eject, which not only ejects the last page of the letter from the printer, but also resets the page-length counter in the event several letters are to be printed in succession.

Save this letter as File #4 by hitting key F10 and typing S - @Edlin. The function of the @ symbol will be explained later.

Printing a Letter and Envelope

The first step toward printing the letter and addressing the envelope is to link the four files (envelope formatter, letter formatter, letter address and letter text). From the File System menu, load File #2, LETTER into memory by typing G 2. The first linked file must be loaded into memory for linking to work properly. Then link the four files by typing L 2, 3, 4, 1, 3 and pressing ENTER. The File System menu should look like Fig. 5.

Before printing, a final routine is necessary to ensure that the automatic page numbering begins with the number "2". From the File System menu, type E; the contents of the LETTER file should appear on the screen. Now press key F4, to enter the Additional Commands menu.

Next, type P, the command for page settings. The prompt will ask for PAGE #:. Type 2, indicating that numbering is to start with that numeral, and press ENTER.

The prompt will now ask for # COPIES:. Respond by pressing ENTER. The next prompt is PRINT TO SCREEN?. Press ENTER again. Now press ENTER once more to exit from the Additional Commands menu. The screen should once again display the contents of the LETTER file.

You're ready to print. Position the first sheet of stationery in the printer, make sure the printer is turned on, recite a short incantation to the micro-dieties, and press the F2 key.

If your prayers are answered, the printer should print the return address (assuming you included it in the file) and the date, and then pause. Press a key and the printer should skip a spa and type the addressee's address, th pause. Again, press any key and t printer should skip another two spac and start printing the letter.

At the bottom of the page, the print should eject the first sheet and pau Position the second sheet and press a key again. The printer should begin printing the three-line heading and th continue with the letter, as in Fig. 6. the letter continues to a third page, t printer should pause again and print t heading with "page 3" at the top.

When the letter is completed, t printer should eject the last sheet a pause again. Position the envelope, a press any key. If nothing happens, pre any key again. The address should printed automatically at the correct p sition on the envelope. Depending the size of the printer's buffer, some the pauses may not occur.

Establishing a Routine

Don't expect all this to work perfec the first time; in fact, plan on consumi a fair quantity of stationery before th routine is fine-tuned to your printer a letterhead. Start this fine tuning by e tablishing a standard way of inserti the paper and anvelopes in the print The commands listed in the figures a based upon a start-print position that approximately one inch below the t edge of the page and approximately inch from the left edge.

If your starting print position is d ferent, you'll have to make adjustmer with the various .margin, .top, and .lin commands. If the second-page headi doesn't print in a spot suitable for yo adjust the values of the various .title a .page commands. Bear in mind that t value of the .top command in the LE TER file determines where the first li of the regular text of the letter will pri and that this value must be at least o greater than the value of the .titlec a .page commands, which determine t line position of the page-numberi heading.

Experiment—it will be worth Once an acceptable format is esta lished it can be used for all your cor spondence.

The second part of establishing routine is managing the address and l ter files. The system I've used identifi each address file with a # symbol a

each letter with the @ sign. Since the File System menu displays four files to a line, address and letter files can be kept adjacent to one another, which should make it easier to keep track of files to be linked. For general correspondence, you can simply create the files in order and purge them as the disk nears its storage capacity.

If you correspond frequently with the same people, you may want to format a disk with approximately 12 addresses, leaving enough room to create letter files. Unfortunately, EosyWriter doesn't permit linking files on separate disks, which limits the ability to use the program for mass-mailing applications. You can, of course, transfer address or letter files from one disk to another by loading them into memory, changing disks or disk drives, and saving the loaded file to the new disk.

A User's Report

I've been using this routine for all of my business correspondence for three or four months now, and it works very efficiently and reliably. My personal preference is to do all of my letter writing on the computer and leave the printout for the end of the day. This keeps me in create mode and frees me from distractions. The end-of-day print routine is good physical therapy.

When I am ready to print, the first thing I do is to get my LETTER file and revise it to list the current date, making sure to revise the text of the .titlea command as well. Then I link files and start printing, letter by letter. The step I forget most often is to reset the page numbering for each letter. You have to do this, or else page two of your second letter will be printed as "page 4".

After a while, you'll develop what I call keyboard routines—sequences of commands which you can execute by rote, without having to think about them or follow the prompts on the screen. For example, in linking and resetting the page numbering, you can just pound out:

"G 2 L 2, 3, 4, 1, 3, ENTER E F4 P 2 ENTER ENTER ENTER ENTER" in rapid succession and be ready to start printing with the F2 key. The keyboard buffer will permit you to input commands ahead of the program, and pretty soon you'll feel enough in control to wail away with computer-assisted letter writing.

EasyWriter Underlining for Epson MX-100 printer.

Frank Vlamings writes: "I spent two days trying to underline words using my newly acquired EosyWriter software and Epson MX 100 printer." Stumped at last, Mr. Vlamings went first to his ComputerLand store and then to IBM for help. There were a couple of false starts, but eventually, Mr. Vlamings did receive instructions which worked. He describes them as "extremely cumbersome" and says, "I don't believe I will use it unless I absolutely have to." He says IBM wrote him that a better "fix" is being developed, but submits the following until an alternative is available.

1. Insert 5 lines above the line you wish to underline (F3)
2. Enter insert mode and type on first line .USER$141
3. Enter insert mode and type on second line .EOL$
4. Delete extra inserted lines above the line you wish underlined
5. Insert 5 lines below the line you wish to underline
6. Enter insert mode and use space bar to move cursor below the word you are going to underline
7. Now type the underline
8. Enter insert mode and type on first line below underline .USER%10
9. Enter insert mode and type on second line below underline .EOL%
10. All embedded commands must be at the beginning of each line and terminated with the end of paragraph (ENTER key)
11. Delete any extra inserted lines below the second line and the rest of the text

—Frank Vlamings

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Jim Strothman

PERSPECTIVES ON PROTECTION

In the 1880s, Gilbert and Sullivan had to steam to New York with a full London cast, and mount an authentic production of their "Pirates of Penzance" in order to head off the success of a 'pirated' American production down the street. International copyrights were scoffed at, and they fought all their lives to secure royalties.

A hundred years later, the protection of copyrighted material is still taking bizarre twists. A federal appeals court has ruled that home videotaping of TV shows is an infringement—overturning a lower court, and disputing evidence that audio taping has not hurt radio broadcast profits. Xerox takes out full-page ads reminding people that they can't 'xerox' something because the company's name is a trademark; they don't want to join Vaseline, Kleenex and Scotch tape, who are fighting to stay out of the public domain.

And computer proliferation . . . well, that has led to the most difficult problem of all. Simply put, it is this: everybody needs 'backup' copies of software, but how can you make copies without opening the door to piracy?

The Software Dilemma

"There is a perception that software is a freebie, that it 'comes with the machine,' and that may have contributed to the piracy problem," says Jeff Walden, public relations manager for VisiCorp.

"Now, manufacturers have realized that software is what *sells* the machine in the first place. The customer doesn't need to know anything about copy-protection except that the disk doesn't copy. Why? To protect our copyright," he says, "and keep it safe from both casual and professional piracy."

The former occurs in many users' groups and among friends: one person buys a program, makes copies and gives them away; they trade them like baseball cards, or pool them for common use. Except possibly to recover the cost of a blank diskette, money rarely changes hands.

"I believe anyone who buys a program has the right to enough copies to feel comfortable."

On the other hand, professional thieves sell illegal copies os *if* they were legitimate, at prices high enough to avoid suspicion but lower than the manufacturer's suggested price or a reasonable discount. Because they have not invested in research and development, marketing, quality control, or after-sale service, their profits are enormous, and do not contribute toward improvements in the next 'generation' of software.

"There are ten man-years of effort that went into the original Apple version of *VisiCalc*," Walden says, "plus the time we spent customizing it for the PC and other computers. There's an awfully large investment in it. Some people feel that software should be priced according to its manufacturing costs, like the price of a diskette. But I say you have to consider the effort that went into development and maintenance.

"We don't know what the piracy will be like for the PC, but it was particularly rampant for Apple computers in general," he adds. "Interestingly, though, piracy seems to bear no relation to the list price of the software. In my estimation, people who made $16 game programs had as much piracy as we did with the $250 *VisiCalc*. Of course, it's hard for me to conceive of grey pinstripe-suited businessmen, huddled over a PC, trading software."

[An IBM spokesperson says, "We're new in the personal computer business, so we're looking at the issue more carefully than in the past. All our PC application programs are copy-protected, but development software isn't. We prefer not to comment on the issue right now."]

Legal Strategies

VisiCorp is "adamant" about copy-protection, legally as well as technically. "We've instituted a license agreement between the company and the end-user," Walden explains, "that increases our copyright protection under the law. There will be no change in the effect on the end-user, but it carries a different legal interpretation, and some users will note that a change has been made."

If that doesn't help stem the tide of piracy, license agreements may grow increasingly restrictive. In a column for the trade journal *Informotion Systems News*, attorney Bruce K. Brickman describes a

hypothetical software license agreement that "contains language making [the] user liable for the consequences of its unauthorized disclosure." Though he is writing about mainframe and minicomputer software, the principle may have to be applied to microcomputer software. "In effect," he writes, "the user becomes an insurer, underwriting the vendor's business."

Innovative Software Applications (ISA) is a company that requires customers to sign license agreements, but its software—chiefly the proofreader Spellguard—is easily copied under the CP/M operating system.

"Users wont to make backup copies, or transfer a program from one disk format to another," says Will Pape, of ISA. "Say they bought Spellguard on an 8-inch single-sided, single-density disk and want to run it on a 5¼-inch double-sided, double-density disk; or suppose they buy a hard disk and want to load it on that."

Technical Strategies

Pape says that ISA has chosen, instead, for every direct sale, to put the customer's name into the first 'page' that appears on the CRT screen. But that's hard to do with sales through dealers, or in private-label (OEM) sales of Spellguard by word processing software companies. Their biggest worry, says Pape, is not the individual customer, but the occasional dishonest dealer who makes more copies for sale than his contract with ISA permits. To solve that, ISA developed a scheme for embedding dealers' names, and the consecutive serial number of each copy, into the software itself. They have made that process available to other software manufacturers and vendors.

"One company hired us to make it possible for a dealer to sell low-priced demonstration copies that can't be upgraded into usable products without the manufacturer's participation," Pape says. "A person can buy a limited version of a program for, say, $10, that's recorded on one side of a disk. If he or she decided to buy the whole program, the dealer calls an '800' phone number and gets a special code to enter into the program. That unlocks the other side of the disk where the full program resides.

"At ISA, we're not selling 'disks,' we're selling service. If there's a way that a software company can verify that a caller is a valid customer, that'll help them provide service, and make piracy less attractive." Pape says, however, that even after direct sales, many customers forget to mail back their 'warranty cards' to register as legitimate customers. Still, conventional copy-protection won't work at ISA. "We don't do copy-protection, because CP/M provides you with all the tools you need to get in and diddle with a program."

CP/M-86 is the operating system that was customized (from CP/M) for the IBM PC by Johnson-Laird, Inc. As Andy Johnson-Laird, its president, admits: "There is no difference as far as copy-protection is concerned—there is no protection!"

"Locks are for honest people, and the law is inadequate," he says flatly. "Even honest users copy software, because they don't perceive that as dishonest. "

Johnson-Laird cites the experience of MicroPro, which in 1980 tried to copy-protect its WordStar (CP/M) program: "It lasted about 30 days, because it was a convoluted technical scheme that got in the customers' way, and screwed up the dealers."

Making The Best Of It

"We've gone round and round on this issue many times," says Bill Baker, president of Information Unlimited Software, Inc., which produces EasyWriter. "IBM asked us to copy-protect it for the PC, as we did for Apple and other computers, but copy-protection is hard on us, and hard on the customer.

"I've come full-circle: I used to be advocate for copy-protection, but not more. Software is intangible," he s "and people don't think of it the way t think of tangible property, like their c puters. Teachers make photocopies books for their students, and comp people make copies of their software

"If we copy-protect our word proc ing program, we know that somebod sure to have an accident with a disk and won't be able to make a copy, or one, in time to get out a critical report whom," he asks, "should we focus ou tention? On the people who are goin rip us off anyway, who get satisfac from breaking our codes? No. We wa make it easier for our legitimate cust ers to use our product, to get our ser and support, and to work with us and from us."

"I believe anyone who buys a prog has the right to enough copies to feel c fortable," declares Peter Gordon, of Microsystems, which does developn and marketing for software products. terribly inconvenient not to have

"Another approach is to build in 'time bombs'—things tha go wrong unless the customer gets periodic updates."

flexibility of extra copies because disks themselves are so easily mis dled. Why put complicated protec schemes into a program in the first pl You're just giving lip service to the t toward customer service."

Future Trends

The next generation of products have more sophisticated copy-protec mechanisms than are now available, these may be as fraught with problen the current crop is.

"Do you remember the famous pu with nine dots, and you have to con them without lifting your pencil from paper? The solution is to go outside square. We may have to do somet dramalic like that," says Andy John Laird. "One approach is to do what A Osborne did with his business app

tions package: he sold the disk media for a low price, letting dealers add value to it by customizing it, but he copyrighted the printed words in the instruction books.

"Another approach would be to build in what I call 'time bombs'—things that go wrong unless the customer gets periodic updates. If the program asks for the date, we could set it up to crash after one year. We could create rounding-errors for numbers, that automatically go into effect after the program has been used a certain number of times; the customer has to get the dealer to refresh the program, somehow, to prevent them.

"The philosophy behind those ideas is that, if you've got stolen stuff it doesn't perform. But surely," he says, "some innocent person will be hurt accidentally."

MLI's Peter Gordon thinks there will always be 'keys' to protection mechanisms. "If you copy a program like VisiCalc," he says, "you get something that *looks* okay, but it won't run because the program encounters an odd-looking track on the disk. One of the utilities that comes with the PC DOS [disk operating system] is called COMPARE. It's used to verify that something is authentic, but it's very primitive. It only checks the data fields and not the formatting of the data on the disks, so it would probably okay a disk copied directly that, in fact, won't run.

"I envision a family of utility programs, that I call a 'superutility,' which will format, diagnose, copy, modify and even restore files that have been 'killed.' Its main use will be for fixing defective disk files," he says, but suggests that it could serve as a kind of 'locksmith.' "There must be 25 other people around the country working on utilities like these."

Bill Baker says that IUS has had to fend off copy-breaking programs. He notes, caustically, that "their disks are copy-protected! You can't use their software to copy their own program. So what side of the fence are they on? The expediency side. They're just out to make a buck.

"We believe in appealing to people's ethics, and having them send in their warranty cards and be registered as legitimate customers. IBM asked us to copy-protect EosyWriter for the PC, and we're dedicated to giving them what they want. But for future products that we sell on our own, we're not going to copy-protect them. We intend to get our products out to people so they can use them with no hassles," he declares.

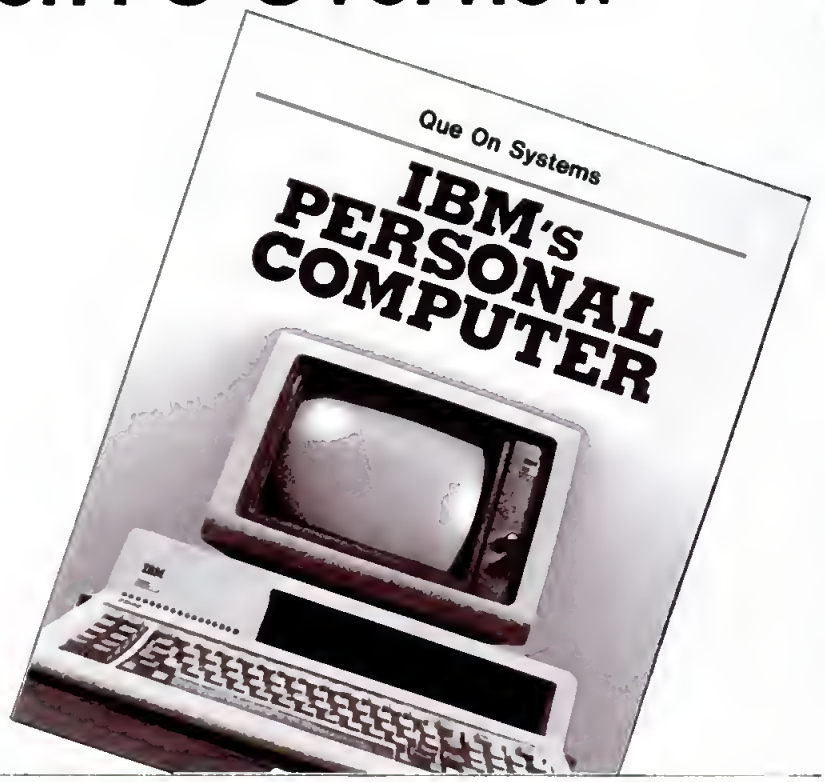
Baker also raises the problem of computer networks as channels for copying software. "Microcomputers are the key to distributed processing and accessing large computers remotely, through services like The Source. You can 'download' programs from their mainframe into your micro. Since there's no way to copy-protect a large, hard-disk pack, copy-protection itself becomes a joke. I say, if you know what you've got, and how to get it, then 'Power to the People!' "

What Do You Say?

Share your views on the copy-protection question. What's fair, what's possible, what's unacceptable from your perspective? A follow-up article will publish a cross-section of replies. Write to: Protection, PC Magazine, 1528 Irving Street, San Francisco, California 94122.

A Team-written PC Overview

IBM's Personal Computer
Que Corporation, Indianapolis;
277 pages, $14.95



IBM's Personal Computer is the product of a "team of writers," according to the book's introduction. Actually, they are a team of experts, not of writers. They have produced a guide to the PC micro which will be an extremely useful aid for some, but is badly written at best, and almost unreadable at worst. Chapter Five, which, ironically, deals with languages, is especially bad.

Since the book has many good qualities, let us begin with the major criticism. It comes of the prevelent misconception that a technical background is of mora use in writing a technical book than an ability to write. The publishers who hold this opinion would not, I think, defend the analagous proposition that a clergyman is batter qualified to build a church than a general contractor. The fact is that any writer worthy of the name can learn a body of information and then prasent it in a craftsmanlike way. That is, once he has spent the years it takes to become a good writer. The four experts who collaborated on *IBM's Personal Computer* should have supplied the information which they have spent yaars accumulating, and let someone with a readable style put it into words. That would have avoided the outrages of syntax, the wordiness, the abuses of the passive voice, and the outright incorrect usage that plague the pages of this otherwise useful work.

IBM's Personal Computer is two hundred and seventy-seven pages long, perhaps ten percent of that length consisting of unnecessary verbiage. It is extremely well organized and laid out, with lots of eye-succoring white space, apt illustrations, a very comprehensive table of contents and, best of all, a good glossary and a thorough index. It is composed of thrae sections and appendices, precaded by an introduction. The introduction sketches the history of IBM, partly as a prelude to pointing out that with the PC, IBM is daparting from some of its traditional policies. For the first time it is using components manufactured by other companies, acting friendly toward software written by outsiders and marketing through non-IBM outlets.

The first section of the book devotes three chapters to describing the machine's hardware, peripherals and operating software. One of the best features of this section is a comparison of various CPUs, in text and chart, and a good discussion of the power of the 8088 CPU used in the PC machine. The authors like this CPU so much that they even honor it with a brief discussion of its lineage, the Intel 8000 series.

Tha second section covers software available for the PC machine. The infamous chapter five discusses the immediately available languages: IBM (Microsoft) BASIC, IBM PASCAL and FORTRAN, University of San Diego's PASCAL and FORTRAN, and the available assemblers. Chapter six explains and evaluates business software presently available through IBM—IUS's *EosyWriter* word processor, *VisiCalc* and Peachtree's general ledger, accounts payable and accounts receivable packages. Chapter seven does the same for educational softwara.

A word about the Que 'evaluations': they consist of text descriptions of the software, their major 'outstanding features' and 'significant limitations.' Accompanying charts list every possible feature a given program could have, and check off those offered by the software under consideration. These charts, or check-lists, were a little gimmicky, with over-involved instructions for weighing their conclusions according to a complicated formula to make them mora relevant to your particular application. Nevertheless, tha evaluations would ba of the greatest help to prospective purchasers trying to decide what word processor or financial package to buy. Strangely, though the educational software was described thoroughly, it was not evaluated—no outstanding features or multi-page chack-lists. This illustrates one of the limitations of the book itself; it is really slanted very heavily toward business users, both in tone and in content. Incidentally, by registering their names with Que, owners of the book may qualify for evaluations of new software as thay are published. Que does not say what charga will be made for this service, if any.

The third part of the book covers 'Other Topics.' These turn out to be various aspects of computer communications:

using the PC as a terminal for a mainframe, use of the data-base services such as Source, intra-office electronic memos, electronic mail, etc. A discussion of various timing modes for computer-to-computer data transfer assumed that the reader knew more about the subject to start with then most likely do.

Here is a weakness of the book. It attempts to be too many things, and is none of them completely. As mentioned ebove, it is mostly a guide for businesspeople who are considering a purchase. But then, why some of the technical discussions, such as the three paragraphs on asynchronous, synchronous and bisynchronous data transmission. The typical businessperson who comes upon that sort of thing is guarantaed to smile politely and turn the whole confusing thing over to the company's Permanent Executive Committee for Purchasing, Evaluation and Institutional Delay.

Furthermore, throughout the book, IBM is spoken of with admiration and reverence. IBM salespeople could use the book as a sales aid. Again, this is probably the result more of confusion over what the book was supposed to be, than a desire to flack for IBM. The book is certainly even-handed about pointing out flaws of hardware and software, as well as superior qualities. It's just that flaws are mentioned with an off-hand shrug, as it were, and superior qualities are written in flashing neon with historical footnotes.

Throughout, the book speculates about what may be expected in tha future. Here, too, an ambiguity nagged. Whence comes the informetion that, for example, future announcements will tell of an increase in the PC's interactive capebility or that a COBOL compiler for the 8086/8 may be expected from Microsoft by mid-1982? Dozens of these forecasts are sprinkled through the book; hardly a subsection does not end with one or two. Unfortunately it is never clear whether the authors' prescience is derived from official announcements, industry rumors, wishful thinking or a crystal ball.

The appendices of *IBM's Personol Computer* are a thoughtful touch. They include a list of IBM BASIC commands, a list of software publishers for the PC machine, and a command by command comparison of two available disk operating systems, PC DOS and CP/M-88. Throughout, the book has other little tidbits which are of interest. It is noted that IBM declined to comment on Que's software evaluations. IBM's warranty and purchase agreement is published in toto. IBM's invitation to independent software writers is passed along. A price list covers the machine and a large number of peripherals.

The book does not leave out much. Notably, competing products were compared only in the category of CPU. I would like to have seen comparisons with Apple, Cromemco, et al. in other categories, such as available software, interfacas, paripherals, lengueges, etc.

Another omission is thet the slent toward business is never spelled out. Unwarned, non-business types might waste time and money expecting to get answers to questions the book never addresses. For instance, I would like to know what kind of video signal the machine puts out. This is not a business question and is not answared here.

In summary, *IBM's Personol Computer*, though written in a very poor style, is otherwise well organized and designed. It will be especially valuabla to prospective business users, at whom it seems to have been eimed. It will also serve well es a general reference for all PC users, especially if the software evaluations increase greatly and at little or no cost. Certainly, if you are shopping for micros, this book would be well worth picking up.

EasyWriter to get improvements

Company executive says updated version is coming

"IBM is going to issue an update to *EasyWriter*; we're writing it for them," said William Lohse, vice president of sales and marketing for Information Unlimited Software, Inc. (IUS), the program's developer, in an exclusive interview with *PC*. "Most of the requests and problems that have been brought to our attention are being addressed in the update," Lohse said. He denied, however, that the revision was directly related to a critical review by Andrew Fluegelman in *PC*'s last issue, saying, "We were doing the work that we are doing before we read Andraw's article."

In addition to revealing the forthcoming *EosyWriter* version and describing some of the changes, Lohse talked about two soon-to-be-introduced IUS products aimed at *EosyWriter* users. One will be a spelling checker that works with *EosyWriter* text files and the other a service that offers advice by telephone to *EosyWriter* users who have questions about using the program. The latter appears to be a ground-breaking move toward separating the sale of a software product from what the computer industry calls "support."

Regarding criticism in the *PC* review, Lohse said, "We accept input from all quarters, and we appreciate it." He said the revised program would "respond to most of the concerns expressed by Andrew Fluegelman and those that have been brought to our attention by other people." Lohse was reluctant to get specific about the nature of the enhancements, "because of our relationship with IBM." But he did indicate that the program's disk storage arrangements, a source of much criticism, will be substantially reworked.

Disk Files To Be Standard

"It writes standard PC-DOS files," Lohse said of the updated program, which will be called "Version 1.1." He said the use of specially formatted disks for *EosyWriter* text files will no longer be necessary; it will be possible to store them on any disk normally formatted for the PC-DOS operating system, and *EosyWriter* files can coexist on a disk with PC-DOS files of any other type. Text files saved by *EosyWriter* will be listed in the usual disk directory with the suffix *.EW* after the file name, such as TEXT.EW. An enhancement related to this change is that standard files from other programs can be loaded into *EasyWriter* for editing, and text edited with *EosyWriter* can include PC programs.

"It's more easily a part of the IBM software operating family," said Lohse. "It works very easily with other programs, at least with [the] *VisiCalc* [program], so you can go ahead and edit *VisiCalc* files or write Pascal or BASIC programs with it."

Besides these details, Lohse described the enhancements as "making it faster and more powerful." "A couple of features in the editor" was as closely as he would pinpoint where the extra power would be most noticeable. Asked if the improvements to making the program "faster" would come by reducing the keystrokes needed for common editing operations, Lohse said, "I know it will be speeded up in some areas." But he added the cautious qualification, "Certainly there are advances made in that area, but I think that the experience may be that it is not as speeded up as people would like it in that particular area." Lohse also said an updated user's manual was being prepared for *EosyWriter* 1.1.

Exchange Plan Hinted

The IUS executive hinted there would be an arrangement whereby owners of the earlier *EosyWriter* version could exchange for the enhanced one, but again he wouldn't discuss specifics. "From our conversations with IBM, the opinion is that we want 1.1 to be the issuance that exists. So they will make it easy for people to get the new *EosyWriter*," he said. "The purpose is to have it get as soon as possible into everybody's hands who bought the original *EosyWriter*, and to have it be well accepted." For new buyers, Lohse indicated that the new version would be sold at the same price as tha original.

New Products

The two new products Lohse revealed were software items—a spelling checker (see box) and a service plan. Asked if it made sense for the company to be working on new softwara while *EosyWriter* was receiving substantial criticism on its lead product, Lohse responded, "That's the same question IBM asked." He continued, "Every singla resource we can put on *EosyWriter* we have put there," and he explained that the spelling checker was actually developed by independent authors and was being handled by IUS in its role as a publisher.

EosyWriter for the IBM PC will be the first product IUS will treat under its planned separate-support approach. "We'll be offering to users the ability to get a specific product—support—in many ways over the phone, and we'll be charging for it," Lohse said. "We think that as the industry develops that will be the way to provide the kind of service we want to provide and make it obvious to peopla what they're getting."

—Jim Edlin

IUS's New Spelling Checker

"We will be coming out with a spell-checking program that will work with *EosyWriter*," said Bill Lohse of IUS. "It will not be available for our Apple market; it will only be available for the PC. It has about 90,000 words, and it fits into about 92K, which is a much stronger compression technique than the others (similar programs) that I know. It's fast. It can handle prefixes and possessives. It can distinguish faults such as improper capitalization and improper use of hyphenation. For example, it may see 'Easy' and say 'I do not recognize that capitalization.'" Lohse said it hadn't been determined whether the product would be distributed by IBM or not.

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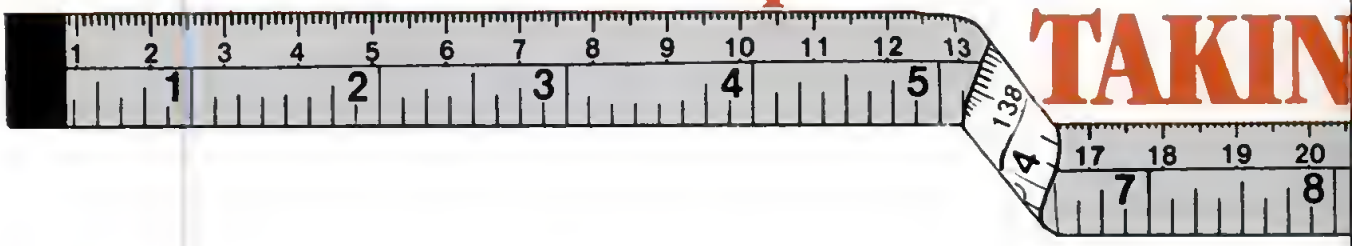
IBM's New Personal Computer



A Glimpse at Two PC Manuals

Jeremy Joan Hewes

In some ways, the Personal Computer is a departure from IBM's usual way of doing things. For example, the computer's price is relatively low, making it competitive with other micros, and the company intends to market programs written by independent software developers. Both of these policies are designed to attract consumers to the exploding small-computer market, a ballpark in which IBM has clearly decided to play (more or less) by the rules of the game.

One solid feature of the IBM entry into the micro market is its user's manuals: they are handsome, practical, clearly written and organized, and concise. As with any guides to new equipment, there are a few omissions or lapses of style, but in general, IBM's own manuals offer a suitable introduction and thorough documentation for both the novice and the experienced user.

IBM's Emphasis

IBM has planned its marketing campaign to appeal to people who are not familiar with computers, an approach reflected in the PC's documentation. For example, the *Guide to Operations*, the fundamental manual that comes with the computer, devotes 168 of its 240 pages to setting up the system and operating it. By comparison, the user's manual for the Osborne 1 computer provides only 31 pages of such elementary information, in chapters titled "Getting to Know Your Computer" and "How to Use Your Computer," before plunging into explanations of its resident programs. The *Applesoft Tutorial*, an introductory manual for Apple II computers, goes overboard in the other direction, cramming its pages with hardware and software details that could clog the circuits of any beginner's brain. IBM's introductory guide falls in the middle, displaying a more personal, less business-oriented approach than the Osborne I manual and a less cluttered, computer-devotee orientation than the Apple II guide.

Although some of the introductory material in the PC's *Guide to Operations (GTO)* covers the computer's disk operating system (DOS) and BASIC, two other manuals prepared by IBM are devoted to the operating system and BASIC language, respectively. Consequently, although there is some overlap in the coverage of BASIC and DOS, this duplication of information assures that a novice can take advantage of the disk operating features and write simple programs using only the elementary manual.

Publishing Savvy

Since the *GTO* is every user's introduction to the PC, a more detailed look at it is worthwhile. Like the other PC manuals, this book is a cloth-covered, three-ring binder that comes in a cloth-covered slipcase. Not only are the manuals elegant-looking, they stand on a shelf or desk without support, eliminating the annoyance of constantly-sliding bookends or the nead for a space-eating storage rack.

"They are handsome, practical, clearly written and organized, and concise."

The binder is smaller than the standard 8½ by 11-inch format, measuring 7¾ by 9 inches. Like most other hardware and software documentation (Apple's spiral-bound manuals are an exception), the ringbinder format allows new pages to be added or corrections to be made inexpensively. The *GTO* pagination format follows another convention in microcomputer documentation: each chapter or major subsection of a long chapter is numbered as a unit (e.g., DOS 8, Keyboard 3) permitting expansion without extensive page renumbering.

Four suggestion/criticism forms at the back of the manual represent another instance of savvy planning. Each is a separate page that can be folded, stapled and mailed, postage-paid, to IBM—not only a nice gesture, but one that will help the company improve its documentation without necessarily compensating the users who provide valuable feedback. Specifically, a note above the space for comments on the form reads: "IBM may use and distribute any of the information you supply in any way it believes appropriate without incurring any obligation whatever. You may, of course, continue to use the information you supply."

GTO's Guts

The contents of the *GTO* offer an orientation to assembling and using the PC system in a logical and easy-to-understand sequence, and consist of six sections: Introduction, Setup Procedures, Operation Instructions (the longest by far), Problem Determination Procedures, Options, and Relocate. Only the "Problem Determination Procedures" section suffers from excessive technical bluster in its title; the chapter should have been named "Troubleshooting," since that's what it's about. The first four sections represent the heart of this manual for new users, the "Options" chapter covers installation of options available from IBM, and the "Relocate" chapter discusses disassembling the system and packaging the pieces to move it to another place (a digest that could have been included in the "Setup" section).

The manual is generously illustrated throughout and consistantly provides a fundamental orientation to working with a microcomputer. Operator commands and examples of screen messages are printed in green, making attractive pages that allow the new user to follow the series of steps that should be followed when giving commands, loading programs, or performing diagnostic tests.

One glaring omission from the screen details, however, is error messages, which are present in the IBM DOS but are nei-

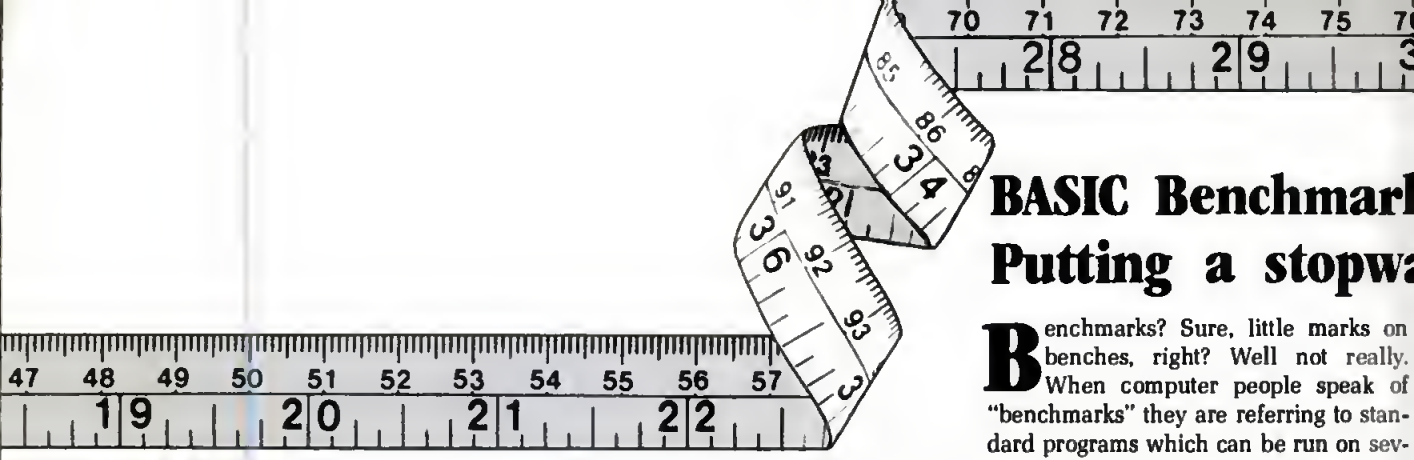
THE MEASURE

Part Two

ther mentioned nor illustrated in the *GTO*. The error messages are listed in an appendix to the DOS manual, but there will be some surprised PC beginners who hit the wrong key or type an unacceptable file name and get a screen response that the *GTO* didn't lead them to expect. This is an omission that certainly should be corrected in future editions of the manual; in fact, it may be an oversight, for at one place in the discussion of DOS, the manual warns users not to touch the keyboard while changing disks (assuming a one-drive configuration)—although there is no clue as to what will happen if they do hit a key. Incidentally, the PC DOS error messages themselves are straightforward and friendly by comparison with those of the CP/M operating system, giving such feedback as "Bad command or file name."

Another more-than-bothersome feature of the *GTO* is the absence of an index, although one is included in both the DOS and BASIC manuals, and *GTO*'s table of contents is detailed enough for beginning users. Finally, cassette storage in a system configuration without any disks is a subject that deserves more attention than it is given; the sole information for cassette-only users is a 14-page section buried in the "Problem Determination Procedures" chapter.

Given these relatively minor and easy-to-remedy exceptions, the PC's *Guide to Operations* is not only a fine tutorial for this computer system but also a good introduction to working with any microcomputer. IBM has gone beyond many other manufacturers' efforts by offering the essentials of dealing with disks, naming files, and even alerting users to the "whirring and clicking" as DOS is loaded from the disk into memory. A "Helps and Hints" section also contains advice that users often get only from friends or salespeople—usually after a catastrophe, such as a warning to make backup copies regularly and to check filenames or commands on the screen before hitting the "enter" (return) key.



Sacrifice in Style

Although the *GTO* should prove to be a valuable source of information for computer novices, it is written in a simple style that even moderately knowledgeable readers may find cloying. Some of the analogies border on silly, such as this explanation of what it means to "write over" a disk file: "Similarly, if you record a Chicago Symphony program on an Elvis Presley tape, you can no longer listen to Elvis." Such attempts to make the text chatty and relevant to all possible users are admirable, perhaps, but they are likely to elicit moans or howls from many readers.

A similar flaw occurs at a few places in the *GTO* text where the authors have assumed too little sophistication and intelligence on the part of readers. For example, in the instructions for typing filenames and commands, the manual confides: "Computers are fussy about the number zero and the letter O—they want what they want, and you can't fool them into taking the wrong one." This almost idiot-level explanation precedes the notation that on the screen the zero has a slash through it and the O doesn't—a fact that could have been stated without the accompanying lecture on computers' dispositions.

Fortunately, these lapses in style and tone are exceptions to a sound introductory manual. More important, IBM has probably come closer than any other micro manufacturer to reconciling the sometimes conflicting needs of computer novices and informed users. In short, the PC's Guide to Operations is much like the computer itself—solid, functional, unsurprising, and just about right.

VisiCalc at a Glance

The first of the independently produced programs and manuals to be distributed with the PC is *VisiCalc*, from Personal Software. This electronic spread sheet is the number-one seller among applications programs for microcomputers as well as a highly appropriate first offering from IBM. In fact, this program's availability alone may influence some wavering buyers to choose the PC rather than its near competition, such as the Xerox 820, which offers another spreadsheet program instead of *VisiCalc*.

The *VisiCalc* manual for the PC has almost the same content as that for the Apple II, although the two versions are written by different authors. To the PC *VisiCalc* manual, author Van Wolverton has added a summary at the end of each chapter as well as two appendices dealing with controlling the printer and exchanging files, respectively. In addition, Wolverton has contributed a fifth lesson to the four included in both versions; this sophisticated new example deals with scientific notation, powers, and formulae.

IBM has chosen to use the same raadable typeface as in other PC manuals, in contrast to the "sans serif" type of the Apple *VisiCalc* manual. Commands and screen messages are also displayed in green, another point of continuity with the system's documentation. Both of the attributes make learning the complex *VisiCalc* program easier, but potential users should understand that this calculation-and-hypothetical-situation program takes study and experimentation, and that its manual is a good deal more demanding than the *GTO*.

Second Opinion

My reaction to the examples of chatty style and simple tone Hewes objects to is exactly the opposite of her view. Such a style probably comes very hard to IBM, and I applaud them for making the effort. I believe many users of the PC will like and benefit from the friendly, basic approach, and think it has a valuable place so long as a separate, un-flowery reference section is provided for knowledgeable users who don't want to be bothered with the novice's tutorials.

—Jim Edlin

BASIC Benchmark
Putting a stopwa

Benchmarks? Sure, little marks on benches, right? Well not really. When computer people speak of "benchmarks" they are referring to standard programs which can be run on several systems in order to compare their performance. In preparing this article, I wrote several such benchmark programs, each of which is designed to measure some aspect of the PC's speed. For example, there is a program that measures the time taken to retrieve information from a random access data file, and another one that measures the time needed for mathematical computations.

In all, twenty-five benchmark programs were used to check out PC BASIC. They covered six major areas of operation: control statements, memory access, text string manipulation, calculation, file processing, and general capabilities. All programs were written in Microsoft BASIC and timed while running with the PC's standard disk BASIC interpreter. (I tested to see if there are speed differences between the three versions of PC BASIC, cassette, disk and advanced; as far as I can see, there are not.)

The timing figures, when taken out of context, may not seem to have much meaning. After all, do you have any instinctive sense of whether 15 seconds is a fast or slow time for a computer to add 5,000 numbers? Probably not. But even so, the tests establish reference points for later comparisons. In the future, we will be able to compare how fast 5,000 additions are carried out using other software such as Pascal or FORTRAN or perhaps some other version of BASIC. We will also be able to measure the impact of new hardware add-ons such as hard disk storage systems or the 8087 arithmetic processor.

The data gained from benchmark programs can also serve another valuable purpose. They can help you "tune" programs that you write. If you want to know how much faster a FOR loop will run when you use integer variables, or how much search time could be saved by reorganizing a data file or changing a buffer size, quick benchmark experiments can tell you.

Control Statements

Benchmarks in the first group tested

the PC's BASIC language

Larry Press

how fast control statements are executed. Test 1 measured the speed of an empty loop (no statements except those of the loop itself) using the FOR and NEXT statements. The loop was tested two ways, once using an integer variable to count the repetitions, and again using a single precision variable to do the counting. Notice in the table of results that the integer version ran about 28 percent faster.

Test 2 is an empty loop similar to the first test, but using the DO and WHILE statements instead of FOR and NEXT. The same two variations were performed here. The DO/WHILE combination is significantly slower, suggesting that, when programming, you should use the FOR statement and integer variables if a loop will be executed frequently.

The third test measured the time used to call a subroutine. Tests 4 and 5 show the time taken to compare numeric and string variables, respectively, for equality. Three variations were done for the numeric comparison, using each of PC BASIC's variable types. Double-precision variables, as might be expected, were handled somewhat more slowly. The string comparison was done four times, using increasingly long strings. Again as expected, the longer the string the slower the response.

Memory Access

Tests in the second group dealt with the time needed to access memory. The experiments were built around assignment statements such as B=A. Statements of this type can be used with all three types of number variables and with string variables, and as an added complication these can be either simple (scalar) variables or elements of arrays. Assignment statements using all types of simple variables all required the same time, although I suspect that slight differences would have shown up if more precise measurements had been taken. Storing information in arrays took longer. Tests 6, 7, 8 and 9 tested memory access first with simple numeric and string variables, then with number and string variables in both one- and three-dimensional arrays.

Two additional facts regarding memory access turned up. Assignments involving string variables require the same amount of time regardless of the string length (evidently memory location pointers are merely altered). It also turned out that access to constants is slower than access to variables by about ten percent.

Variations on Test 1 showed that the length of variable names and the number of variables in a program also affect execution speed in the PC BASIC. Presumably the reason is that before a variable's value can be found in memory, the interpreter must look up its location in a symbol table. The larger the symbol table, the longer this procedure takes.

"To my disappointment, the PC was only about 13 percent faster than an Apple II computer."

I experimented with two ways of lengthening the symbol table—using longer variable names, and adding names. When, in the empty loop program of Test 1, the variables "INDEX" and "NUMBER" were substituted for "I" and "N", execution time jumped from 26 seconds to 34. An equal slowing was recorded when I established 24 other one-letter variables before running the test with "I" and "N". Thus, if you write a program in which certain variables are accessed very often, it might pay to give them short names and define them early.

Text String Manipulation

Tests 10 through 13 examined the manipulation of text strings. The test involved removing three-character substrings from the 11-character string "LARRY PRESS." I did one test each where the substrings were taken from the beginning, middle, and end of the larger string, then one test combining all three operations. The time taken to extract a substring from the middle was 25 percent longer than at either end.

Arithmetic Speed

Computers wouldn't be called computers if arithmetic speed were not important. Tests 14 and 15 covered that area. My first test included addition, subtraction, multiplication, and division done all together. As usual, I ran it with all three types of number variable. Surprisingly, integer arithmetic proved slower than single precision. To discover why, I ran tests that each included only one of the four operations. Integer division turns out to be the culprit. Furthermore, execution time is influenced by the order in which operations take place; when I reversed the order of multiplication and division in my test program, execution time was cut by ten percent.

Complex Calculations

If you are interested in engineering and scientific applications, you may be curious as to the speed of computation involving transcendental functions such as SIN. Test 16 looked at the speed of these functions. Single precision computations are predictably faster than double; and the magnitude of the argument doesn't seem to affect execution speed in most cases.

File Processing

For all my test on file processing, I used a setup with the program disk in one drive and the data files on an otherwise-blank disk in the other drive. Test 17 measured the time to locate and read 200 randomly selected records from a 1,000 record file. In these cases, using a record length that was a power of two resulted in noticeable time savings.

Because random access files are sometimes processed serially, Test 18 investigated this and found that execution time is a direct function of record length. But here, execution time was unaffected by whether or not the record length was a power of two.

One surprising thing I found was that changing the size of the memory buffer for processing random access files, which PC BASIC allows, had no effect. When I quadrupled the buffer size for my test program from the default 128 characters, the speed stayed exactly the same. Since this discovery contradicts the BASIC manual, I tried Test 19, which copies a file instead of merely reading it. Again to my surprise, a large buffer provided no speed-up.

Several tests were run using serial files. Copying a 100-record file with 128-character records took one minute even.

BASIC Benchmark Tests

CONTROL STATEMENTS

Number	Test	Numeric Type	Repetitions	Time (sec.)
1A	FOR-NEXT	integer	30,000	26
1B	loop	single	30,000	38
2A	DO-WHILE	integer	5,000	20
2B	loop	single	5,000	24
3	GOSUB call		15,000	31
4A	IF A = B	integer	10,000	32
4B	THEN	single	10,000	32
4C	branch	double	10,000	35
		String Length		
5A	IF A$ = B$	1	10,000	30
5B	THEN	10	10,000	35
5C	branch	100	5,000	34
5D		255	2,000	25

MEMORY ACCESS

Number	Test	Numeric Type	Repetitions	Time (sec.)
6A	B = A	integer	10,000	22
6B	assignment	single	10,000	22
6C		double	10,000	22
		Dimensions		
7	B$ = A$		10,000	22
8A	B(I) = A(I)	1	5,000	16
8B	B(I,K,L) = A(I,K,L)	3	5,000	25
9A	B$(I) = A$(I)	1	5,000	17
9B	B$(I,K,L) = A$(I,K,L)	3	5,000	26

STRING MANIPULATION

Number	Test	Repetitions	Time (sec.)
10	MID$	5,000	25
11	LEFT$	5,000	20
12	RIGHT$	5,000	20
13	all above	5,000	55

ARITHMETIC SPEED

Number	Test	Numeric Type	Repetitions	Time (sec.)
14A	+ − ÷ ×	integer	5,000	49
14B		single	5,000	39
14C		double	5,000	137

Number	Test	Time (integer)	Time (single)	Time (double)
15A	+	15	18	18
15B	−	15	17	20
15C	×	15	18	21
15D	÷	29	22	111

COMPLEX CALCULATIONS

Number	Test	Time (single)	Time (double)
16A	tangent	68	68
16B	sine	27	27
16C	cosine	44	44
16D	arctangent	20	21
16E	exponential	18	18
16F	log	19	20

FILE PROCESSING

Number	Test	Buffer Size	Record Length	Time (sec.)
17A	random search for 200 from 1,000		63	50
17B			64	45
17C			127	69
17D			128	56
17E			129	68
18A	serial read through 1,000		63	28
18B			64	26
18C			65	28
18D			127	56
18E			128	56
18F			129	56
19A	copy 50 records	128	126	27
19B		512	128	28
19C		128	127	28
19D		512	127	29
20A	see note			57
20B		456		38
20C		912		32

Note: Copy 100 records of 114 characters each. Test 20A is serial copy routine, 20B and 20C use "pseudo-random" technique.

RANDOM NUMBERS

Number	Test	Numeric Type	Time Normal*	Time Short*
21A	which of	integer	136	121
21B	8,190 numbers	single	178	162
21C	are prime	double	186	170

*"Short" times are when all variable names in program (e.g., "PRIME") are reduced to a single letter ("P").

BENCHMARK-DERIVED TIPS

1. Use the FOR statement rather than DO WHILE for critical loops.
2. Use integer variables for loop indices.
3. Long variable names will slow your program down by making the symbol table larger.
4. Define frequently accessed variables early in your program to force them to the top of the symbol table.
5. Pay attention to the order of operations in critical arithmetic expressions since it has an effect.
6. Use integer arithmetic when possible, but beware of integer division.
7. Make random access record lengths powers of two, even if you have to add a little padding.
8. Use the "pseudo-random" technique for processing serial files.
9. Never put remarks inside of frequently executed loops.

A few ways in which you can speed your programs up were discovered while benchmarking the BASIC interpreter. Some of these (short variable names, for example) are inconsistent with good programming and documentation practice, so use them only in critical parts of your programs.

A BENCHMARK PROGRAM

```
10 DEF FNTIME=VAL(LEFT$(TIME$,2))*
   3600+VAL(MID$(TIME$,4,2))*
   60+VAL(RIGHT$(TIME$,2))
20 DEFINT I-N
30 A=1
40 INPUT "TRIALS";N
50 I=FNTIME
60 FOR I=1 TO N
70 B=A+A
80 NEXT I
90 PRINT FNTIME-I
100 INPUT "MORE";Y$
110 IF Y$="N" THEN STOP
120 GOTO 40
```

The program used for Test 1. Lines 10, 50 and 90 use the PC's internal time-keeping function to time the test

Speed did not seem affected by slight changes in record size. In another test, I used a sample file of 100 name-and-address records with a 114 character record size. Treating it as a normal serial file, 57 seconds were required to make the copy. Test 20 is the one that copies the same file using the BASIC manual's "pseudorandom" recommendation; here, larger buffer sizes finally produced a noticeable time saving.

General Capabilities

The final benchmark tests I ran evaluated random number generation, video output, REMARK statements, and two larger programs testing overall performance.

Random number generation was tested because game programs often use it. To generate 15,000 random numbers took 35 seconds.

As I ran the benchmark programs, it seemed to me that the computer was writing information to the display screen rather slowly. So I devised a test that covers the screen with lines of 79 "X"s then jumps to the upper left corner and repeats. On a PC with a monochrome display adapter, it took 74 seconds to fill the screen ten times. For comparison I ran the same test on a Digital Microsystems computer connected to a standard 9600-baud terminal, also using Microsoft BASIC. On that system the test ran in less than half the time—35 seconds—suggesting that if you require fast video output from BASIC programs you may have to use assembly language subroutines.

The REMARK test was merely an empty loop with a REM statement in the middle of it. The addition of that REM more than doubled execution time, so be careful not to put remarks inside of loops.

For a more general test, I used the program PRIME that appeared in a September, 1981 Byte magazine article by Jim Gilbreath. Gilbreath wrote the program in many different computer languages and published the results of running it on many different machines. The program looks for prime numbers (those undivisible by factors other than themselves and 1), and is a good test of overall performance since it combines arithmetic, control statements and memory access. Test 20 checked the time needed to find which of the first 8,190 odd numbers are prime.

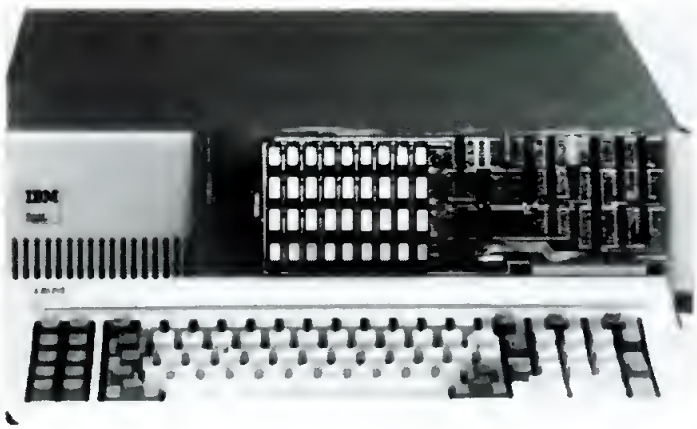
Comparative Results

To my disappointment, the PC was only about 13 percent faster than an Apple II computer on the prime-number test. Several of the other tests were also run both on the Apple and on a computer with a Z-80 microprocessor, each using Microsoft BASIC. In general, the PC is about halfway between the two in internal computing speed. Although the Intel 8088 microprocessor can operate on two bytes of data at a time, it is slowed down by the fact that the data must be transferred to and from memory one byte at a time.

For a software comparison, I ran a Pascal language equivalent of the prime number program, using the Microsoft Pascal compiler. The compiled version ran more than 20 times faster than the PC BASIC version, and compared favorably to results for this benchmark on Z-80 based computers with similar software.

For a printed copy of the programs used by Larry Press to run his PC benchmark tests, send a self-addressed, stamped business-size envelope to *Benchmarks, PC, 1528 Irving Street, San Francisco, California 94122.*

FIGHT THE SQUEEZE!!



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Floppy Disc Controller with serial printer interface now you can connect your serial printer (Avail. May)	FDC/sp	$249
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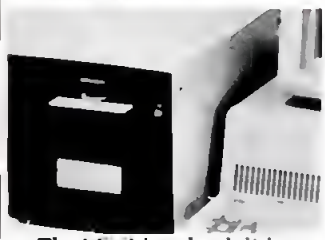
NEW ON THE MARKET

HARDWARE

Hard Disk Storage

Three companies heve introduced products for users who want to upgrade their disk storage cepacity. Datamac's edd-in Winchester disk system can be instelled directly in the floppy disk eree of the IBM PC. The system includes the disk drive, disk controller (which supports es meny es four Winchester drivas, is fully buffered, end offers automatic error correction), software, and documentation. Aveileble in May, the system will offer storage capacities of 6MB ($2995), 12MB ($3495), or 18MB ($4195) per drive.

Datamac Computer Systems, 680 Almanor Ave., Sunnyvale, CA 94086; (408)735-0323.



The MiniMega hard disk end floppy disk backup system includes a controller, host edepter, operating softwere, power supply, ceble, cabinat, and operating instructions. The systam conteins an on-board microprocessor, makes media errors trensparent to the host computer, and is available either alone, in 5 or 10MB configurations, or integrated with a 5.25-inch, 1MB floppy disk backup. Contact the company for information about price and e current $200 rebate.

Santa Clara Systems, Inc., 560 Division St., Campbell, CA 95008; (408)374-6972.

Davong Systems' DSI-501 Winchester disk drive fits inside the Drive Two location in the IBM PC chassis, providing 5MB formatted file capacity end e dete transfer rate of 5 megabits per second. Compatible with both the PC-DOS and Qunix (Unix-like) operating systems, it includes the Winchester disk drive, e disk controller board, power supply, cebles, and software (diagnostic program, hard-disk formatter, and instaliation/configuration program). Tha DSI-501 is presently available through ComputerLand stores at a suggested reteil price of $1995.

Davong Systems, Inc., 10601 Terra Bella Ave., Mauntain View, CA 94043; (415)965-7130.

Finally, as of March, Tallgress Technologies' TG-1000/1200 Winchester HardFile subsystems will incorporate the newly developed TG-100AT combined disk/tape controller, which includes a revised format allowing increased dete storage per track and increases the storage capacities of the TG-1000 and TG-1200 to 6.267MB and 12.534MB, respectively.

Tallgrass Technalagies, 9009 W. 95th Street/P.O. Box 12047, Overland Park, KS 66212; (913)381-5588.

Inexpensive Color Plotter

Hewlett-Peckard's new HP 7470 is e microprocessor-based, small-formet pen plottar cepable of an 8.5 x 11-inch plot erea, two-color output, 1/1000-inch resolution (step size), and a plotting speed of 15 inches per second.

Tha plotter is capable of accepting either 8.5 x 11-inch or ISO A4-size paper. It automatically selects between two pen stalls and can eccommodate both HP fiber-tip pens (available in ten colors and two widths) and transparency pens (sevan colors, two widths) used to produce overhead projections. Intelligence features include built-in character generation and the ability to rescale (enlarge/reduce) or reconfigure (expand/condense) images end characters eutometically.

The unit is equipped with an RS-232C interface and requires a maximum of 25 watts to operate. Graphics software (HP-GL) to drive the plotter is availabla, although it is unclear whather or not it will run on tha IBM PC.

The HP 7470 will be availeble March 1 through computer retailers and Hewlett-Packard; the suggested retail prica is $1550.

Memory Expansion Boards

Davong Systems has announced the availebility of e series of RAM expansion boards: the DSI-64K ($325), the DSI-192K ($750), end the DSI-256K ($950). These boards may be placed in any free system slot, are compatible with all IBM PC hardware and software, and are availeble from ComputerLand.

Davong Systems (see above)

Memory Technologies' MT512-XIB memory board offers a maximum capacity of 512KB of random access memory with full parity checking, bank selectable in blocks of 64KB to allow the user to purchase tha board with an initial 64KB and then to expand it to full capecity using the company's MT649 Memory Expansion Sets. The board ranges in price from $499 (64KB) to $1995 (512KB) and is covered by a one-year warranty on parts and labor.

Memory Technalagies, Inc., 25 Main St., Twelve Mile, IN 46988; (219)664-5741.

An error-correcting memory board available in storage capacities ranging from 64KB ($495) to 192KB ($1195), in 64KB increments, hes been introduced by Boulder Creek Systems. Tha boerd detects and corrects single-bit arrors and flags double-errors as a parity error.

Boulder Creek Systems, 4859-C Scotts Valley Dr., Scotts Valley, CA 95066; (408)438-4546.

Autodial Modem

General DataComm's 103J-M is an euto-enswer modem designed for full duplex, asynchronous operation ovar the switched network at data rates of from 0 to 300 bps. The modem, which operates over all dial telephone lines, features Autometic/Menuel end Date Talk modes.

General DataComm, One Kennedy Ave., Danbury, CT 06810; (203)797-0711.

Peripheral Switchboxes

Two peripherals-switching stations have been introduced by Automated Control Systems. The ACS 200, a three-position parallel switching box, allows the user to alternate betwaen two, Centronics-Compatible printers from a single CPU port; e front panel switch controls printer choice. The ACS 232 seriel switching box permits a single computer port to support two terminels; the switch is fully buffered end operates at baud rates up to 1MB. Both the ACS 200 end

NEW ON THE MARKET

the ACS 232 have a list price of $129.95.

Automoted Control Systems, 1801 130th NE, Suite 4, Bellevue, WA 98005; (206)881-0177.

Communications Cards, Etc.

AST Research is presently offering a series of products designed to enhance the storage and communications capabilities of the IBM PC. These include:

—A series of memory expansion boards, ranging from 64KB ($495) to 256KB ($1145), with full parity checking; fully essembled, tested, end burned-in.

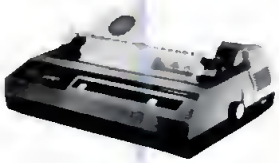
—Two asynchronous, serial communications boards: the CC-032 (one RS-232 port) for $145; and the CC-132 (two RS-232 ports) for $275.

—An advanced communicetions board, the CC-232, feeturing two independent, programmable RS-232 ports supporting asynchronous, bi-synchronous, SPLC, and HDLC protocols.

—A direct-connect modem offering two ports: an RS-232 serial and a direct-channel modem.

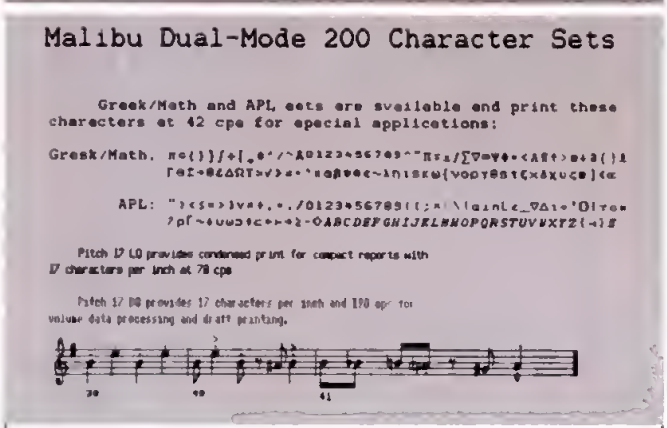
AST Reseorch, Inc., 17925 Sky Pork Circle, Suite B, Irvine, CA 92714; (714)540-1333.

Graphics Printer



The Centronics Model 122 graphics dot-matrix printer is e 120 characters-per-second (CPS), 132-column desk-top peripheral intended for use in dete and business processing epplicetions. It provides both alphanumeric printing and 6- or 8-pin addressable graphics; other standard features include bidirectionel printing in single-spece elphanumeric mode, uni-directionel printing in graphics mode, end selectable forms length and lines per inch. The suggested list price is $1195.

Centronics Doto Computer Corp., Hudson, NH 03051; (603)883-0111.



Dual-mode Printer

Malibu Electronics has introduced the Dual-Mode 200, a printer capable of performing both high-speed (165-200 CPS) data processing tasks as well es high-quelity, low-speed (42-70 CPS) word processing duties. Features include the ability to output proportionally spaced and justified text; to change fonts end/or print-quality modes et eny point in a document; end to employ e variety of text emphesis devices, including boldface end underlining. A selection of fonts is available. The suggested list price is $2995.

Molibu Electronics Corporotion, 2301 Townsgate Rd., Westloke Villoge, CA 91361; (805)496-1990.

Carrying Cases

The Computer Cese Company has introduced e line of cerrying ceses for the IBM-manulactured PC components: the IB1501 ($129) can contain the CPU, keyboard, and manuals; the IB502 ($99) holds the monitor; and the P403 ($89) is designed to cerry the metrix printer. In addition, these cases can be used to provide dust-free storage and cen be locked to prevent unauthorized access.

Computer Cose Compony, 5650 Indion Mound Court, Columbus, OH 43213; (614)868-9464/(800)848-7548.

SOFTWARE

UCSD p-System

Network Consulting, Inc., (NCI) has introduced an implementetion of the Version 4 Softech/UCSD p-System operating system for the IBM Personal Computer. The p-System is an operating system that compiles programs written in Pascal, FORTRAN, and BASIC into a form in which the programs are "trensportable" between (can be used on) machines built around a variety of different microprocessors. The NCI implementation includes features thet enhance memory use and storage options and allow the use of non-IBM peripherals.

The NCI p-System supports RAM disk, a feature thet allows eny extre memory to be used es if it were loceted on e floppy disk and thereby significently increases the speed of certain operations (e.g., compiling). By fully utilizing the space available on the floppy disks, NCI p-System makes it possible to use ten sectors per track rether than the eight IBM recommends, resulting in e 25 percent increase in disk storage capacity. Automatic discrimination between eight- and ten-sector diskettes is provided, assuring compatibility between IBM (eight) and ten-sector diskettes. In eddition, any combination of single-sided (provided with the PC), double-sided, and double-density (double-tracked) disk drives is supported.

The operating system also includas a number of other features, such as a floppy disk formatter for all supported diskette formats; herd disk back-up and recover functions vie floppy diskette; terminal mode; remote supervisory terminal support; and a number of I/O support functions. The company plans eventuel support for Ominet and the 8087 coprocessor and for the Corvus Constelletion, Tall Grass Technology, and Tecmar hard disk systems. Although the p-Systam is available as a package (including total system, Pascal compiler, extended memory, native code generator, double-treck support, RAM disk, Turtlegraphics, and print spooler) for $800, a number of other, separately priced options ere offered.

Network Consulting, Inc., A106-1093 W. Broodwoy, Voncouver, Canodo V6H 1E2; (604)738-3500.

FORTH Language

PC/FORTH, e complete FORTH program development system for the IBM PC, has been introduced by Laboratory Microsystems. The basic package ($100) includes an interpreter/compiler with virtual memory management; the fig-(FORTH Interest Group) FORTH line editor; a screen editor modified to teke edvantage of the PC's grephics display capabilities; an 8088 essembler; a reverse translator; debugging eids, utilities, and a series of demonstration programs. The FORTH vocabulary has been extended to give full access to all PC-DOS opereting system facilities. Options include floating point extensions (available either in full software or support routine ver-

sions) for a series of arithmetic coprocessors ($100) and the Laboratory Microsystems' version of the Nautilus FORTH Cross Compiler ($300, requires PC/FORTH).
Laboratory Microsystems, 4147 Beethoven St., Los Angeles, CA 90066; (213)306-7412.

Word Processor

Select Information Systems has announced the availability of an IBM PC version of their Select word processing system. Select, which includes an on-screen, interactive teaching program (Teoch), is designed for the novice user whose only interest in a computer is in its ability to accomplish tasks. The program, which is compatible with virtually all CP/M-based systems, includes two 5.25-inch floppy disks containing the word processor, Teoch, and installation instructions; Superspell (a proofreading program); Merge Print (a program that integrates mailing lists with any Select document); and a reference manual. The suggested retail price is $595.

The company has also introduced two new software programs: Teoch/M, a self-teaching program designed to introduce novice users to the essentials of using CP/M; and Converse, a CP/M-based telecommunications program for general office use.
Select Information Systems, 919 Sir Francis Drake Blvd., Kentfield, CA 94904; (415)459-4003.

IN PRINT

Periodical Index

COMPendium is a monthly, periodical guide to the contents of computer publications. The bulk of the magazine consists of synopses of all non-editorial articles appearing in 20 major personal computer magazines (from Byte to TRS-80 Micro-computer News) and of directories of book, hardware, and software reviews found in those publications. COMPendium includes a section called "ADwatch," which lists the publications in which advertisements for major products appeared, as well as a section called "Infoservice", an inexpensive ($20/75 words) classified advertisements section in which users' groups, newsletters, magazines, stores, etc., can describe their activities and services. Subscriptions cost $18 per year in the U.S. and $20 in Canada. Publisher/Editor: Michael Bierbauer.
Epicurious Publishing Company, P.O. Box 129, Lincolndale, NY 10540.

Reference Cards

Two products designed to reduce the time spent saarching through the manual for forgotten syntax rules or commands have been recently introduced. The IBM PC BASIC Memory Joggar is a single-sheet, color-coded list of the computer's commands, statements, functions, and alternate keys. It measures 8.5 x 14 inches, includes a built-in easel to allow it to stand upright, and costs $10.
JC Computer Specialists, P.O. Box 3465, Federal Way, WA 98003.

The Easy Find reference card contains 14 panels of information obtained from the IBM BASIC manual and includes lists of information such as Basic statements, commands, I/O-related functions, string-related functions, graphics and color, and operators. All entries are alphabetized and contain a brief description of the item and an example of its use. Printed on light cardboard, it costs $3.50.
Minimagic Co., 104 Pork Rd., #34, West Hortford, CT 06119; (203)233-6261.

PC/FORTH

Laboratory Microsystems is now shipping a complete FORTH program development system for the IBM Personal Computer. The basic package includes the FORTH interpreter/compiler with virtual memory management, the fig-FORTH line editor, a full screen (visual) editor optomized for the PC graphic display capabilities, a true 8086 assembler with local labels, a reverse translator, debugging aids, utilities, and many demonstration programs. FORTH "screens" are stored in standard random access disk files, and may coexist with other PC-DOS program and data files. The FORTH vocabulary has been extended to give full access to all PC-DOS operating system facilities including file and record management. A 150 page manual includes detailed operating instructions for the editors and assembler, a full description of the PC/FORTH internals, an extensive glossary, and a listing of the PC/FORTH nucleus.

Floating point extensions are available in a full software version or as support routines for the AMD 9511, AMD 9512, or Intel 8087 arithmetic coprocessors.

Our version of the Nautilus FORTH Cross-Compiler allows you to create dedicated disk or ROM-based applications written in FORTH. Headerless programs may be generated which are extremely compact and are nearly impossible to disassemble.

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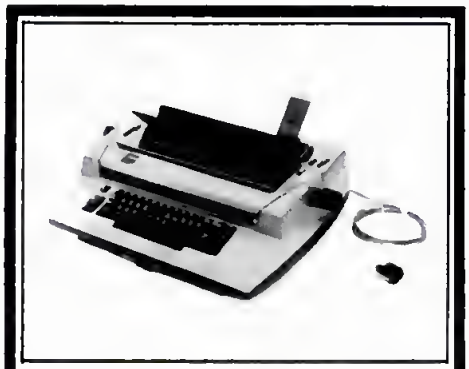

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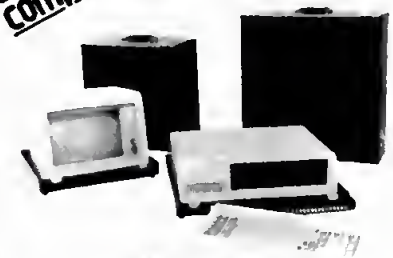

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A PC EXCLUSIVE INTERVIEW/DAVID BUNNELL

Microsoft's Vern Raburn

When *PC* Publisher David Bunnell recently interviewed Vern Raburn, President of Microsoft Consumer Products, he asked him point blank if Microsoft would be coming out with a word processor for the PC. Raburn refused to answer but we believe the following discussion will be of interest to our readers. We think that by declining to answer, Raburn may have answered the question. Anyway, he gave us pause for thought.

Raburn: "*Few people even have a glimmer of the power . . .*"

PC: Is Microsoft plonning o word processing pockoge for the IBM Personol Computer?

Raburn: I cannot answer that question.

PC: With o 16-bit mochine ond oll of thot oddressable memory, you could come up with o writer's dreom.

Raburn: One of tha critical elaments of word processing today is that the really good word processing machines—such as Wang and Xerox—are dedicated systems. This is one of the reasons why *WordStar* suffers by comparison. You have to use all of those control codes. Of course, their response is "Hey, if I am keeping my hands on the keyboard, and I am only adding one key, those control sequences become much faster than punching a dedicated key."

PC: But it is so easy to hit o wrong control key.

Raburn: The theory is that people who use word processing machines are people who type all the time. This means that they are very proficient at the keyboard. They don't hit wrong keys. I am just giving you the party line right now. I don't agree with this completely, but unless you are willing to go out and build a dedicated machine with a lot of dedicated functions . . .

PC: The IBM hos some dedicoted keys.

Raburn: There are ten function keys. You can do many things with them. IBM has been insistent that we implement those keys into any products we produce. Multiplan uses those keys. That is a problem with word processing. If we really want to get into it. The way that the word processor becomes really nice is when you get away from keyboard input. Which means, use keyboard input for words only and use something like a mouse, or a joy stick, or a track ball for the editing commands.

PC: Voice recognition would be o greot woy.

Raburn: Oh, voice recognition is the ultimate solution.

PC: I would think thot o system thot could recognize words such as "delete" might be possible now.

Raburn: Voice recognition is still not a viable alternative. I believe strongly that it ultimately will be, but right now it cannot be done.

PC: Whot ore the possibilities for integrating a word processing progrom ond grophics with on electronic spreod sheet progrom?

Raburn: I would throw in database management. That's where the 16-bit processor comes in. When you have a megabyte of working memory you can put all that stuff in there. Then you are talking about a complete information processing system. A knowledge processing system, if you will.

PC: How for ore we away from thot?

Raburn: In soma ways it exists today. That is what the Star system is. The Star will ultimately have all of those capabilities—database, word processing, graphing, charting, communications.

PC: You're tolking about the Xerox Stor system?

Raburn: Yes, exactly. If you want to pay about $100,000 you can have it now. We are a couple of years away from doing that on a $5,000–$10,000 machine.

PC: With o mochine like thot you could be o one-mon ormy.

Raburn: It's phenomenal. There are very few people even in the computer business who have even a glimmer of the power that we are going to make availeble to people in a very short period of time. The 18-hour days around here get tiresome. But I believe that Microsoft will be one of the companies in the forefront that ultimately integrates all of this technology. We are coming up to one of those points in history that occurs every once in a while where a group of totally separate technologies are going to start maturing simultaneously. The result is going to be a new technology—a new way of doing things that has never even been thought of before. That is extremely exciting.

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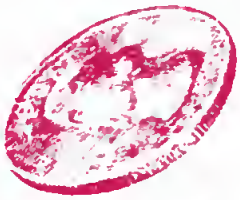

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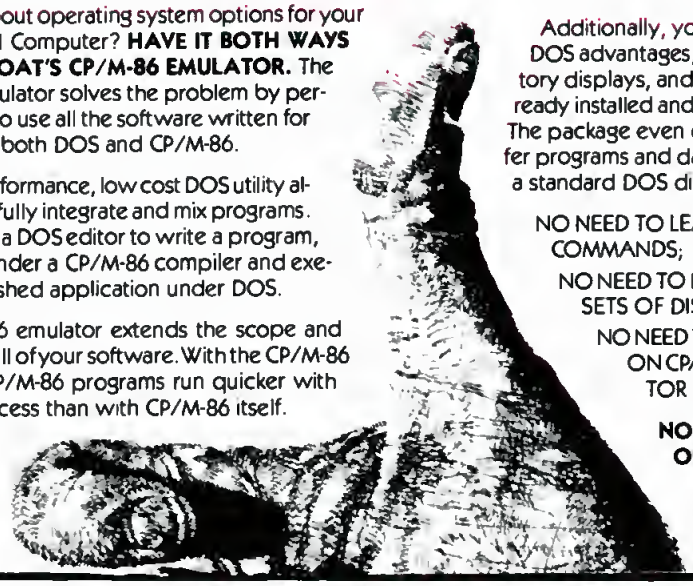

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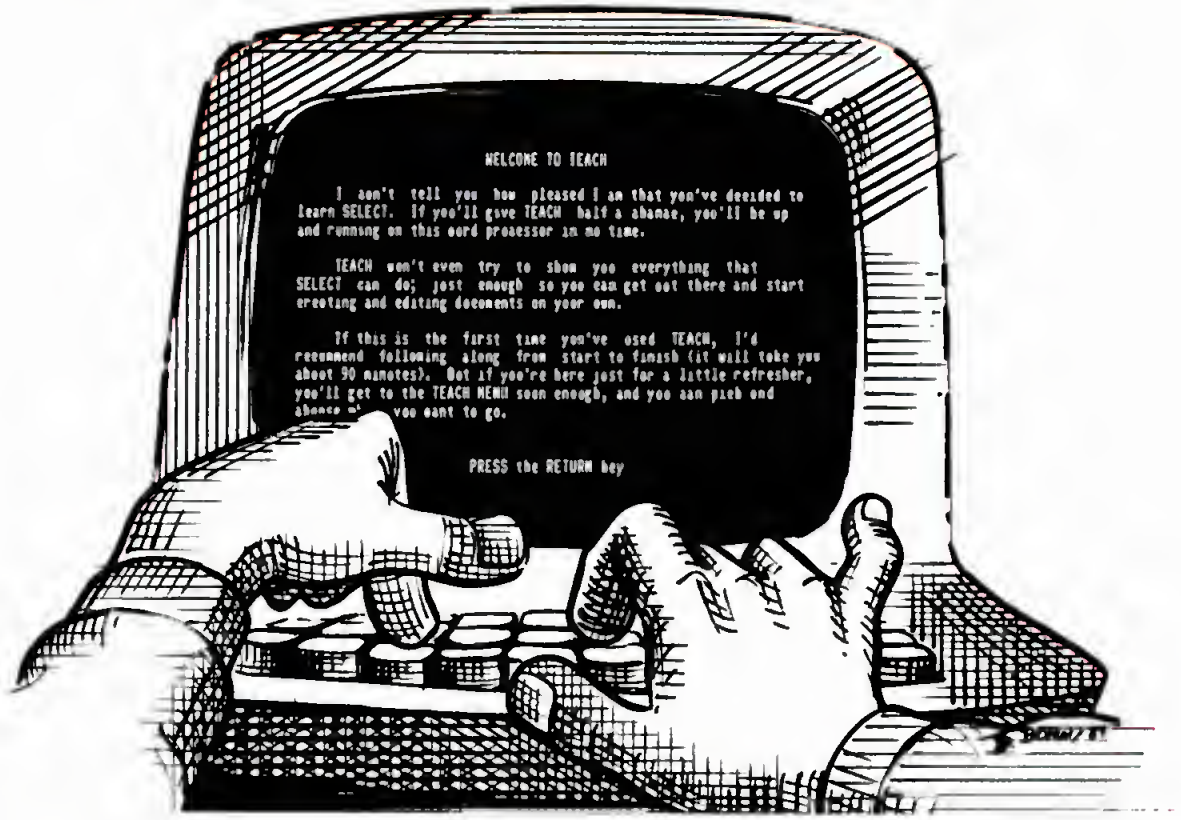

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Use your PC to keep an easy update catalog of your disks and files. Program maintains entries for each disk or file with date, size, your comments, and cross references. PC DOS 64K. Send $30 check or money order; 30 day money back guarantee.
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COMPUTERLAND OF ALMADEN
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San Jose, California 95118
(408) 267-2162
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What to read after you buy your IBM® Personal Computer.

David Bunnell and Eddie Currie

THE AGE OF ALTAIR

Part Two

The personal computer traces its roots back to the Altoir computer first manufoctured in Jonuory, 1975, by Mits, Inc., o little company which came from the desert sands of Albuquerque, New Mexico. For the next two and o half years, Mits, Inc. so dominoted this new found market thot the company literally defined personol computing. David Bunnell ond Eddie Currie were both uniquely involved in the beginning of personal computing as Mits vice presidents. Together in this exclusive PC *series, they tell the story of* The Age of Altair.

CONTEXT OF THE REVOLUTION

It is important to understand the period in which the Altair Computar was born if one is to truly appreciate the growth of what was initially considered a modest market.

Students of the computer in the early 1970's were constantly frustrated by the computer priesthood which domineted the cathedrals of the computers, i.e. the computer centers. These sacred shrines provided shelter and isolation for the IBM 360, the Univac 1130 and other such number-crunching beasts.

Computer students spent countless hours laboring, often in vain, not at the computer but at key punch machines. Having punched their programs into Hollerith cards, an artifact of the previous century, they made their way with great temerity to the hallowed computer room. Thay weren't allowed insida this room, but instead were permitted to pass their deck of cards through a small window and retire to await the "job" completion.

Enter The Hungry Card Reade

In as little as two hours or in cases as long as two weeks they ret to the little window to learn that the puter system crashed, or the card r ate all their cards, or the cards dropped prior to introduction int card reader (that is, the operator wa en an opportunity to shuffla the dec their listing had inadvertently bee tached to the listing of another pe output who was nowhere to be f and so on.

In those rara instances when the of cards and the printout were returi was often discovered that a comm been delated from, say, column 12 first card in the deck and that, of c was "Fatal Error Number 345"—wh you could find the right reference ual, could be decoded as meanin again, Charlie."

From the Sands of New Mexico came the World's First Personal Computer

No one was permitted to touch the
mputer unless they were a member of
priesthood. Consequently there
olved the popular academic pastime of
ing an axa to tha computer. Thus the
mputer was further restricted by metal
rs, armed guards, police dogs, electron-
locks and other devices.

st A CIA Plot

It was commonly believed that such
iversity computers were instruments of
vert activities sponsored by the CIA.
owever, computer students knew that
s a ludicrous concept because they
ew the problems associated with run-
ng a tan-card program to sort a few
mbers in ascending ordar. It could take
ys, if not weeks, to get such a program
rking.

By lata 1974 frustration among those
erested in computers had reached an
-time high. Thus, when the free spirits
ong them learned of the availability of
omputer which could be purchased for
aw hundrad dollars and anshrined in
e's spara badroom or garage they pro-
led Mits Altair a ready market.

The majority of those who flocked to
post office had limited discretionary
nds, so they purchased the "kit form" of
Altair computer. Mits soon found a
iving business trying to repair the myr-
l attempts to render bags of resistors,
ckets, integrated circuits, capacitors,
Ds, pc boards and a plethora of other
n-descript components—held in place
cross-threaded screws and acid cora
lder—into a living, breathing computer
th flashing lights that rivalad the IBM
nts.

Of course, tha half-lifa of these home-
ew computers was relatively short
nce tha acid was slowly eating the
ched circuit from the pc card. Critical
mponents ware not infrequantly found
rking amongst the edga connectors on
e mother board having slipped their
rly solder bonds.

llo, Hello, Hello . . .

It was during this period that Mits de-
loped the concept of "infinite hold."

Though the Altair could be purchased in assembled form, most early customers opted to build the low-price kit, shown here in an early Mits advertisement.

This early byproduct of the microcomputer revolution resulted when hobbyists found access to university and other institutional telaphones from which they called Albuquerque without charge to discuss at length fine points of remote computer construction.

Some of these hobbyists are still holding, yet even so these interminabla telaphone calls rapidly consumed tha available Mits repair staff so that computers waiting in the repair queue were often left to trespass on eternity.

The Great Chip Debate

For some time prior to the advent of the Altair computer, debate had raged at Harvard betwean Bill Gates and Paul Allen as to which microprocessor they should write a BASIC interpreter for. The announcement of the Altair with its Intel 8080 CPU ended thesa discussions and sent three young enthusiastic men (the third was Monty Davidoff, aka Mad Dog) off to write the code which would eventually find its way into millions of personal computars.

A few weeks later, Paul Allen arrived in Albuquerque armed only with a paper tape having never seen an 8080 chip. Within twenty minutes 4K Altair BASIC was up and running.

With the release of a 4K dynamic memory board along with 4K BASIC on paper tape, the teletype machine all but vanished from the surplus stores where it had bean stashed in great excess. Although BASIC had appeared on college campuses years earlier, it had fallen into disfavor for serious work and was replaced by FORTRAN and COBOL. Undaunted, the hobbyist picked up the BASIC banner and pressed on. This simple act of faith was to hava an anormous impact upon future generations as we shall see.

Consuming Megahours

Many a megahour was consumed by the unsuspecting hobbyist in front of his trusty teletype machine waiting patiently for Altair BASIC to be loaded into the machine through the paper tape reader. Often the end of the tape was met by abject silence meaning that somewhere a tiny cell within the bowels of the 4K dynamic memory board (remember the term "dynamic" as it will loom up out of the swamp again) had "dropped a vital bit" during tha loading process. A major breakthrough occurred each time the system responded with the long awaited "MEMORY SIZE?" prompt which meant that with any luck at all you would soon ba running BASIC.

Strange as it may seem, Mits discovared that customers who could not afford a talatypa machine or 4K memory board were often far happier if their computer was not functioning sinca that laft them with an avocation, viz. repairing it. Another interesting discovery was that much of the desira to own an Altair was based on the prestige an owner got by impressing his friends that ha had his own computer.

Tha result was that thousands of people mailed in the full payment for their computers which they might not see for waeks or even months. The cash requirements for Mits ware greatly facilitated by this nevar-ending backlog.

The Federal Trade Commission entered a new era of bureaucratic red tape with the advent of the mail order computer. Many of the regulations in effect today grew out of Mits related activities.

20,000 Programs For The IBM

Baby Blue

CPU PLUS

™

FOR THE IBM PERSONAL COMPUTER

XEDEX

Are Now Available Personal Computer!

INTRODUCING BABY BLUE CPU PLUS

Baby Blue CPU Plus is an accessory printed-circuit board for your IBM Personal Computer and special software on disk.

As far as normal PC DOS operations are concerned, Baby Blue acts just like any other normal, mild-mannered 64K byte random-access memory board.

But when you invoke a CP/M-80* program, Baby Blue becomes a second computer within your computer, letting you run thousands (literally thousands) of programs written for the CP/M microcomputer operating system.

CP/M, the first microcomputer operating system to gain wide acceptance, has been around since 1975. Not only has it played host to a lot of programs, but those programs are among the most useful, most sophisticated, most thoroughly tested and debugged, most proven programs ever written. More than 200,000 computers were field-testing those programs for you before the IBM Personal Computer even existed.

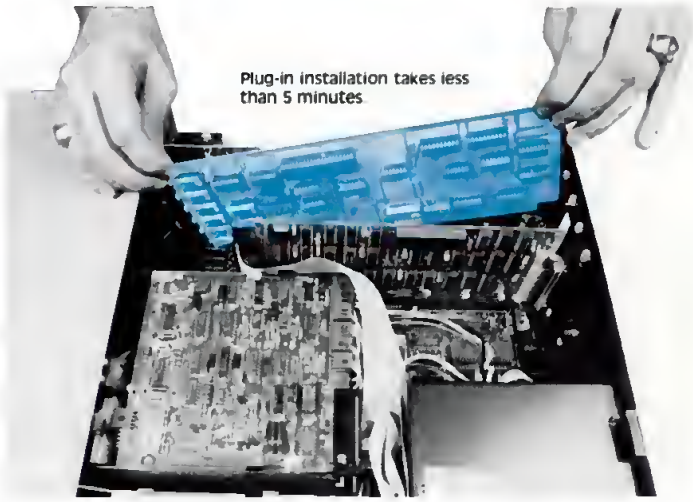
The total CP/M library is immense. It includes the best efforts of thousands of professional and advanced-amateur programmers. There are time managers, spreadsheet manipulators and professional-office packages. Languages — BASIC, of course, ALGOL, FORTRAN, C, Pascal, LISP, COBOL, PILOT, and FORTH, to name a few. Text editors, text formatters, full-blown word processors, spelling checkers and indexers. Utilities that will massage problem files so that they lie back and purr. Games, including chess, Reversi, Adventure and tournament-level Star Trek. Database managers. Accounting packages that can run a million-dollar business . . . just about anything you can imagine.

The net result is an integration of CP/M programs into the PC environment that's so smooth, so transparent that you won't need to know or care which operating system a program was originally written for.

WordStar*, the popular CP/M word processor is among thousands of programs that can now be run on the IBM PC with Baby Blue.

Special Baby Blue Features:

- Additional 64K memory, fully available to PC DOS — looks just like the IBM 64K board to the system.
- Will accept CP/M programs on any of several popular 5¼" soft-sectored diskette formats.
- 63K of user memory is available for CP/M programs — 7K more than on any other popular machine.
- Files can be shared — CP/M and PC DOS programs can be mixed in a menu-driven system with common data files.
- IBM Personal Computer peripherals are supported — including keyboard, video boards, printer, Asychronous Communications Adapter.



Plug-in installation takes less than 5 minutes.

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or write XEDEX Corporation
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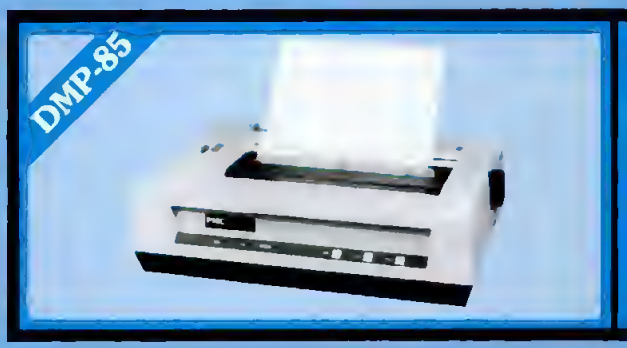
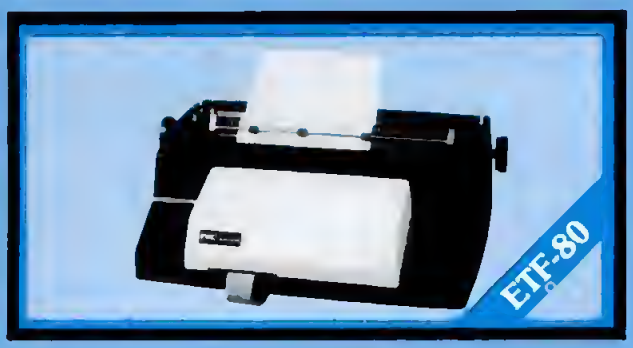


Price $495



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Advertiser Index

ADVERTISER	PAGE
dvanced Operating Systems	43
mdek Corp.	65
pparat, Inc.	74
pplied Software Technology	34
ST Research	107
itstream Inc.	115
obert J. Brady Company	130
alifornia Micro Computer	129
hrislin Industries	82
ompuCart	93
ompuServe	28
omputer Case Company	129
omputer Control Systems	127
omputerized Management Systems	34
omputer Systems Design	121
omputer Trader	129
RC Personal Computer Products	123
TI, CompuThink	19
ataMac	111
avong Systems	103
.G. Electronic Developments	124
igital Marketing	14
igital Research	5
asy Data Systems	96
lectroHome	29
lectronic Specialists	121
scon Products	83
XO Systems	7
antasia Systems	94
lagstaff Engineering	94
& G Engineering	98-99
loward Sams	33
BM	Inside Front
CR Future Soft	64
letik Corp.	41
nnovative Computer Products	92
nnovative Software	4
nnovative Software Applications	92
nterface, Inc.	113
ntermedia Systems	86
nternational Software Alliance	10
nternational Software Marketing	53
ntersell	42
eller Software	81
raft Systems	80
aboratory Microsystems	128, 115
eading Edge Products	Inside Back

ADVERTISER	PAGE
Lifeboat Associates	18, 132
Lifetree Software	35
MMIS	123
Macrolink	84
Maynard Electronics	122
Microcorp	32
The Microperipheral Corp.	94
Microsoft, Inc.	1
Microsystems	134, 115
Moonware Co.	87
Network Consulting	57
NH3 Computer Accessories	129
Omric	90
Owl Software Corp.	38
PC Logic Systems	87
Personal Micro Computers	142
Personna	79
Quadram Corp.	39
Quala	83
Quantum Software	62
Santa Clara Systems	52
Seattle Computer	20
Select Info Systems	133
Sigma Designs	47
Software Laboratories	97
Software Masters	102
Sorcim	72, 73
Stoneware	88
Sysco Software	123
Systemics	34
Tall Tree Software	90
TCI Software	130
Tecmar	Back Cover
TexaSoft	94
Veritas Technology	115
VisiCorp	13
V.R. Data	88
Xedex	140-141

CORRECTIONS

In the previous issue's Advertisers Index, the advertisement of G&G Engineering, on pp. 70-71, was incorrectly identified as that of Godbout Co.

The previous issue's excerpt of *Don't* by Rodnay Zaks, beginning on p. 72, should have been identified as Copyright © 1981, Sybex.

PC regrets the error and omission.

Coming Up

CP/M's Creator

PC interviews Gary Kildall, creator of the CP/M operating system, to find out what the future holds for this software family on the IBM Personal Computer.

PCs In The Classroom

National University, in San Diego, is using PCs by the truckload to acquaint students with the power of personal computers. We visit to see how.

At The Faire

For the past five years, the West Coast Computer Faire has been one of the seminal rites of the personal computer world. PC reports on the IBM PC's impact at the 1982 Faire.

"Letter Quality" Printers

When dot-matrix printing isn't good enough, you may want one of these. PC surveys what's available and helps interpret the choices.

Plus . . .

An evaluation of the PC keyboard in Taking The Measure, Part 3 . . . a PC profile, product reports, and plenty more . . .

WISH LIST

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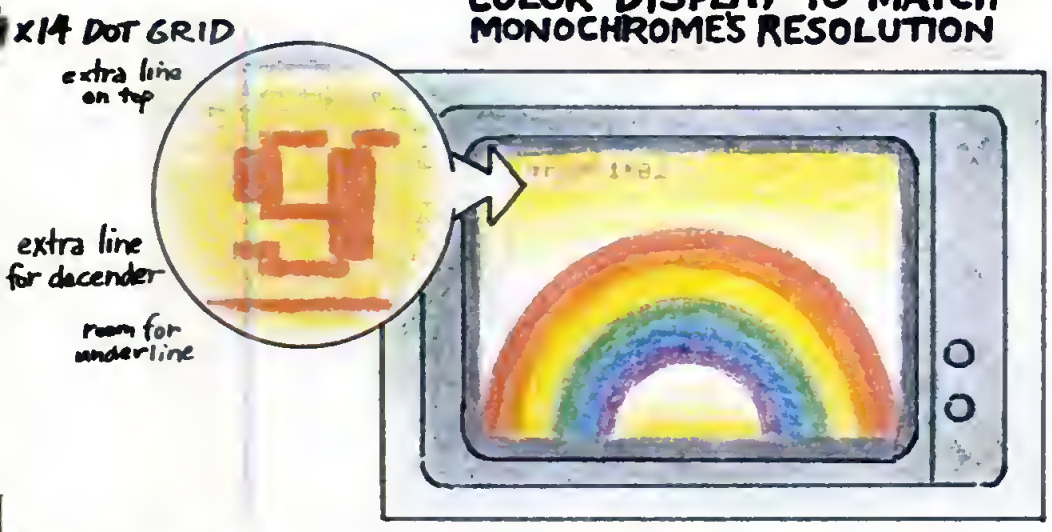

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—Robert Brown
Sunnyvale, Calif.

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—Frank G. Wood
Newhall, Calif.

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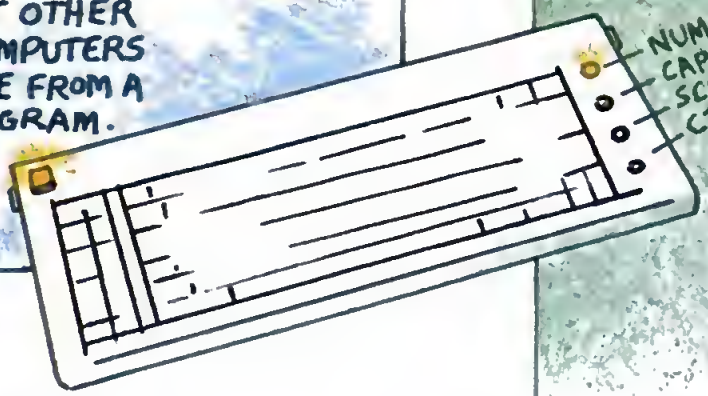


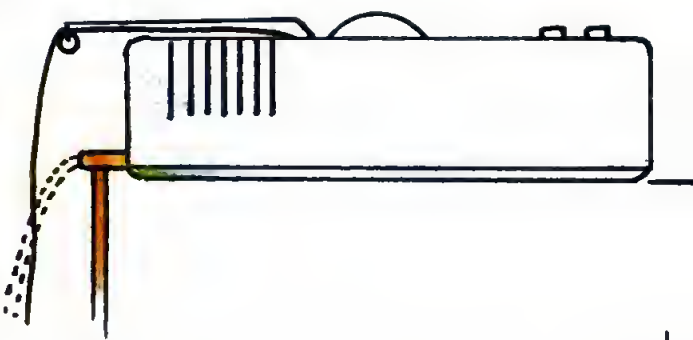
LIGHTS ON KEYBOARD TO INDICATE STATUS OF TOGGLES.

—Diana Herro
San Diego, Ca

RIGHT ANGLE PRINTER PLUG

UNLESS IBM PRINTER IS PUT FULL FORWARD ON PRINTER STAND, PAPER SCRAPES THE CABLE. RIGHT ANGLE CABLE WOULD SOLVE PROBLEM.

—Patrick John Sebracht
San Diego, Calif.



PC invites readers to contribute Wish List ideas for publication. Any product, service or design idea you'd like to see for IBM Personal Computers is appropriate. Ideas selected for publication will be illustrated by *PC*'s artist if needed. *PC* will pay $25 for the featured Wish List idea in each issue. $10 for others published. All ideas published will be credited to the submitter and become the property of *PC*. In case of duplicate submissions, any award will go to the earliest postmark. Send a description or sketch of your idea to *Wish List, PC, 1528 Irving Street, San Francisco, California 94122*. Sorry, we can't discuss the Wish List feature by telephone.

REMEMBER:

MORE THAN JUST ANOTHER PRETTY FACE.

Says wha? Says ANSI.

Specifically, subcammittee X3B8 of the American National Stondards Institute (ANSI) says sa. The fact is all Elephant™ flappies meet ar exceed the specs required ta meet or exceed oll their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group af peaple representing a large, well-bolonced cross sectian af disciplines—from academia, gavernment agencies, and the camputer industry. Peaple from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department af Defense, Haneywell and The Associatian of Camputer Progrommers ond Analysts. In short, it's o bunch af high-caliber nitpickers whase mission, it seems, in order to make better disks for consumers, is olso to make life miserable for everyone in the disk-making business.

Haw? By gathering tagether periodically (aften, one suspects, under the full moon) ta concoct more ond mare rules ta increase the quality af flexible disks. Their most recent rule baok runs aver 20 single-spaced pages—listing, and insisting upan—hundreds upon hundreds of standards o disk must meet in order ta be blessed by ANSI. (And thereby be taken seriously by people who toke disks seriausly.)

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